Appointment

From: Penman, Crystal [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=93662678A6FD4D4695C3DF22CD95935A-PENMAN, CRYSTAL]
Sent: 8/9/2018 5:21:50 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Kristy Bulleit [kbulleit@hunton.com]

Subject: CWA 316(b) issues
Attachments: Real ID Information.pdf
Location: 1201 Constitution Ave NW, Washington DC 20004; WJCE 3233; Please call 202-564-5700 for escort

Start: 8/31/2018 3:00:00 PM
End: 8/31/2018 3:30:00 PM
Show Time As: Tentative

Recurrence: (none)

Kristy Bulleit
Partner
kbulleit@HuntonAK.com
p Ex. 6
bio | vCard

Hunton Andrews Kurth LLP
2200 Pennsylvania Avenue, NW
Washington, DC 20037

REAL ID

Does it affect me?



If the state of residence is marked in blue, you will need to present a form of acceptable ID other than a driver's license or state-issued identification card to access this facility.

The list of jurisdictions subject to enforcement changes over time. For the most recent list, please visit http://www.dhs.gov/secure-drivers-licenses#1.

Homeland Security

Department of Homeland Security Office of Policy
www.dhs.gov/secure-drivers-licenses

Appointment

From: Wildeman, Anna [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=05dd0af69bfa40429e438b7646502b99-Wildeman, A]
Sent: 8/9/2018 5:21:52 PM
To: Wildeman, Anna [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=05dd0af69bfa40429e438b7646502b99-Wildeman, A]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Kristy Bulleit [kbulleit@hunton.com]
CC: Penman, Crystal [Penman.Crystal@epa.gov]

Subject: CWA 316(b) issues
Attachments: Real ID Information.pdf
Location: 1201 Constitution Ave NW, Washington DC 20004; WJCE 3233; Please call 202-564-5700 for escort

Start: 8/31/2018 2:00:00 PM
End: 8/31/2018 2:45:00 PM
Show Time As: Tentative

Kristy Bulleit
Partner
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Appointment

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To: Wildeman, Anna [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=05dd0af69bfa40429e438b7646502b99-Wildeman, A]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Kristy Bulleit [kbulleit@hunton.com]
CC: Penman, Crystal [Penman.Crystal@epa.gov]

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Homeland Security

Department of Homeland Security Office of Policy
www.dhs.gov/secure-drivers-licenses

Message

From: David Friedman [DFriedman@afpm.org]
Sent: 9/1/2017 10:39:29 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: Automatic reply: Follow up on call regarding Hurricane Harvey and Gulf Coast Refiners

I will be out of the office thorugh September 1 and will have limited access to e-mails. If you need immediate assistance, please contact Ariel Sarandinaki at Ex. 6

Message

From: Nolan, Robert M [robert.m.nolan@exxonmobil.com]
Sent: 9/1/2017 6:04:09 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: Re: TX/LA Flooding

Lee, happy to talk at 4:30. Pls call my home phone at Ex. 6 I have less than adequate cell phone reception.

Also our Emergency Support Group for the response meets at 3 ET today. If you have specific questions it would be good to feed them into the Group at that time.

Thanks

Robert Nolan

Ex. 6

On Sep 1, 2017, at 1:16 PM, Forsgren, Lee <Forsgren.Lee@epa.gov> wrote:

> Thanks Michael.
>
> Andrew and Robert. It is very nice to meet you. Perhaps we could chat later this afternoon, after 4:30 pm EDT would work best for me. My direct number is Ex. 6
>
> Thanks,
> Lee
>
> **D. Lee Forsgren**
> Deputy Assistant Administrator
> Office Of Water
> Environmental Protection Agency
> 1200 Pennsylvania Avenue, VW
> Room 3219 WJCE
> Washington, DC 20460
> Phone: 202-564-5700
> Forsgren.Lee@epa.gov
>
> **From:** Michael Whatley [mailto:MWhatley@hbwresources.com]
> **Sent:** Friday, September 1, 2017 12:23 PM
> **To:** andrew.c.knapp@exxonmobil.com; Forsgren, Lee <Forsgren.Lee@epa.gov>; Nolan, Robert M <robert.m.nolan@exxonmobil.com>
> **Subject:** TX/LA Flooding
>
> Andy, Robert and Lee –
>
> Want to introduce you (at least electronically) and open up a line of communications between ExxonMobil and Lee regarding the flooding in Texas and Louisiana.
>
> Lee is serving as the Acting Assistant Administrator for Water at EPA.

Please let me know if I can do anything to further aid your conversations.

Michael

<image002.jpg>

Michael Whatley
HBW Resources
1666 K Street, NW, Suite 500
Washington, DC 20006
Ex. 6

Message

From: Michael Whatley [MWhatley@hbwresources.com]
Sent: 9/1/2017 4:22:56 PM
To: andrew.c.knapp@exxonmobil.com; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Nolan, Robert M [robert.m.nolan@exxonmobil.com]
Subject: TX/LA Flooding

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Michael

HBW RESOURCES

Michael Whatley
HBW Resources
1666 K Street, NW, Suite 500
Washington, DC 20006
Ex. 6

Message

From: Pica Karp, Maria [MPica@chevron.com]
Sent: 9/2/2017 2:39:49 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: Re: Re: Hurricane Harvey Flooding - Chevron/EPA Contacts

Ok - am in stand by as well. Take care, Maria

Sent from my iPhone

On Sep 2, 2017, at 10:14 AM, Forsgren, Lee <Forsgren.Lee@epa.gov> wrote:

> Thanks Maria. Will talk to Puneet this morning if I have any questions I will ask him.
>
> Sent from my iPhone
>
> On Sep 2, 2017, at 10:10 AM, Pica Karp, Maria <MPica@chevron.com> wrote:
>
> > Lee: Thanks for you note. I understand that you are schedule to speak with Puneet this morning. In sum, thankfully, with the exception of some fuel access issues in the Houston area, our operations were not impacted. We have accounted for a very large majority of our employees and are supporting recovery efforts.
> >
> > Do let me know if you have any questions after speaking with Puneet and thanks again for reaching out. Maria
> >
> > Sent from my iPhone
> >
> > On Sep 1, 2017, at 6:28 PM, Forsgren, Lee <Forsgren.Lee@epa.gov> wrote:
> >
> > > Lady and Gentlemen,
> > > Just following up to make sure that "No News is good News!" on the Chevron Gulf front?
> > >
> > > Regards,
> > > Lee
> > >
> > > **D. Lee Forsgren**
> > > Deputy Assistant Administrator
> > > Office Of Water
> > > Environmental Protection Agency
> > > 1200 Pennsylvania Avenue, VW
> > > Room 3219 WJCE
> > > Washington, DC 20460
> > > Phone: 202-564-5700
> > > Forsgren.Lee@epa.gov

From: Pica Karp, Maria [mailto:MPica@chevron.com]
Sent: Wednesday, August 30, 2017 3:10 PM
To: Forsgren, Lee <Forsgren.Lee@epa.gov>; Michael Whatley <MWhatley@hbwresources.com>; Washington, Gregory J (GWashington) <GWashington@chevron.com>; Koetzle, William A <bkoetzle@chevron.com>
Subject: RE: Hurricane Harvey Flooding - Chevron/EPA Contacts

Thanks Lee. I'm on the way back to WDC (mid-flight) today. If you have an immediate question, Greg and Bill are reachable today. Otherwise, happy to touch base tomorrow. Maria

From: Forsgren, Lee [mailto:Forsgren.Lee@epa.gov]
Sent: Wednesday, August 30, 2017 11:35 AM
To: Michael Whatley <MWhatley@hbwresources.com>; Pica Karp, Maria <MPica@chevron.com>; Washington, Gregory J (GWashington) <GWashington@chevron.com>; Koetzle, William A <bkoetzle@chevron.com>
Subject: [**EXTERNAL**] RE: Hurricane Harvey Flooding - Chevron/EPA Contacts

Thanks Michael,

Maria – It is great to meet you if only electronically. I would love it if we might find time to talk later today or early tomorrow on the state of play on your facilities in the Harvey impacted area. And please don't believe what Whately, Washington, and Koetzle say about me I am really not THAT bad.

Regards,
Lee

D. Lee Forsgren

Deputy Assistant Administrator
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Environmental Protection Agency
1200 Pennsylvania Avenue, VW
Room 3219 WJCE
Washington, DC 20460
Phone: 202-564-5700
Forsgren.Lee@epa.gov

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Sent: Wednesday, August 30, 2017 11:28 AM
To: MPica@chevron.com; Washington, Gregory J (GWashington) <GWashington@chevron.com>; Koetzle, William A <bkoetzle@chevron.com>; Forsgren, Lee <Forsgren.Lee@epa.gov>
Subject: Hurricane Harvey Flooding - Chevron/EPA Contacts

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Maria runs the DC shop for Chevron and is communicating daily with the folks in Houston and San Ramon. I have also copied Bill Koetzle and Greg Washington, who are working on these issues from the DC office.

Please let me know if I can do anything to further aid your conversations.

Michael

<image001.jpg>

Michael Whatley
HBW Resources
1666 K Street, NW, Suite 500
Washington, DC 20006
Ex. 6

Message

From: Nolan, Robert M [robert.m.nolan@exxonmobil.com]
Sent: 9/2/2017 12:20:35 AM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: Re: TX/LA Flooding

Will do Lee. Thanks for reaching out.

Robert Nolan
Ex. 6 (M)

On Sep 1, 2017, at 6:25 PM, Forsgren, Lee <Forsgren.Lee@epa.gov> wrote:

> Robert,
>
> It was great to talk to you this afternoon. Let's stay in touch over the next few days. Hopefully the calls will be short with little to talk about except that things are getting better in Texas.
>
> If you need to contact me, call me on my EPA cell at Ex. 6
>
> Have a great weekend.
>
> Lee
>
> **D. Lee Forsgren**
> Deputy Assistant Administrator
> Office Of Water
> Environmental Protection Agency
> 1200 Pennsylvania Avenue, VW
> Room 3219 WJCE
> Washington, DC 20460
> Phone: 202-564-5700
> Forsgren.Lee@epa.gov

From: Nolan, Robert M [mailto:robert.m.nolan@exxonmobil.com]
Sent: Friday, September 1, 2017 2:04 PM
To: Forsgren, Lee <Forsgren.Lee@epa.gov>
Subject: Re: TX/LA Flooding

Lee, happy to talk at 4:30. Pls call my home phone at Ex. 6 I have less than adequate cell phone reception.

Also our Emergency Support Group for the response meets at 3 ET today. If you have specific questions it would be good to feed them into the Group at that time.

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Ex. 6 (M)

On Sep 1, 2017, at 1:16 PM, Forsgren, Lee <Forsgren.Lee@epa.gov> wrote:

> Thanks Michael.
>
> Andrew and Robert. It is very nice to meet you. Perhaps we could chat later this afternoon, after 4:30 pm EDT would work best for me. My direct number is 202-564-0311.
>
> Thanks,
> Lee
>
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> Michael
>
> <image002.jpg>
>
> **Michael Whatley**
> HBW Resources
> 1666 K Street, NW, Suite 500
> Washington, DC 20006

Ex. 6

Message

From: Washington, Gregory J (GWashington) [GWashington@chevron.com]
Sent: 9/2/2017 12:12:35 AM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
CC: Michael Whatley [MWhatley@hbwresources.com]; Koetzle, William A [bkoetzle@chevron.com]; Verma, Puneet (puve) [PVerma@chevron.com]
Subject: Re: RE: Hurricane Harvey Flooding - Chevron/EPA Contacts

Lee

I am the upstream point in the office.

Basically we were fortunate because the Chevron operated facilities in the GOM were operating normally last report.

Puneet is our EPA point of contact who can discuss all things EPA related and Bill is our domestic team lead.

Maria is the Boss-Head of the D.C. Office.

Have a good long weekend Lee

Sent from my iPhone

On Sep 1, 2017, at 6:28 PM, Forsgren, Lee <Forsgren.Lee@epa.gov> wrote:

> Lady and Gentlemen,
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>
> Regards,
> Lee

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Ex. 6

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HBW RESOURCES

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Ex. 6

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Sent: 9/6/2017 2:40:54 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: Beaumont Refinery Update

Lee, this morning our Beaumont Refinery notified TCEQ of its intent to discharge storm water from Harvey through an NPDES permitted outfall into the Neches River. We will be monitoring this operation closely relatively to our permit parameters. We also have resources available on-site to monitor and manage any potential environmental impacts, including river and sorbent booms and on-site response personnel should they be needed.

Glad to discuss …

Regard, Robert

Ex. 6 (Office)
(Cell)

Message

From: Alex Beehler [Ex. 6]
Sent: 8/21/2017 3:31:20 PM
To: Brent Fewell [brent.fewell@earthandwatergroup.com]
CC: Adam Kieper (akeiper@thenewatlantis.com) [akeiper@thenewatlantis.com]; Adam Kolton (kolton@nwf.org) [kolton@nwf.org]; Adam Krantz (akrantz@nacwa.org) [akrantz@nacwa.org]; Adam White (ajwhite@stanford.edu) [ajwhite@stanford.edu]; Alex Echols (echols@conrod.com) [echols@conrod.com]; Alex Hanafi (ahanafi@edf.org) [ahanafi@edf.org]; Andrew R. Wheeler Esq. (andrew.wheeler@FaegreBD.com) [andrew.wheeler@faegrebd.com]; Angela Logomasini (alogomasini@cei.org) [alogomasini@cei.org]; bbarnes@tnc.org; Becky Norton Dunlop (becky.norton.dunlop@heritage.org) [becky.norton.dunlop@heritage.org]; Benjamin H. Grumbles [Ex. 6] Bill Briggs (bill@billbriggs.net) [bill@billbriggs.net]; Brent M. Haglund PhD (bhaglund@sandcounty.net) [bhaglund@sandcounty.net]; Brian Mannix (brian@mannix.com) [brian@mannix.com]; Brian McCormack (brian@brianvmccormack.com) [brian@brianvmccormack.com]; Brian Yablonski ([Ex. 6]) [Ex. 6] Brown, Byron [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9242d85c7df343d287659f840d730e65-Brown, Byro]; Bruce I. Knight (bknight@stratconserve.com) [bknight@stratconserve.com]; Bryan Hannegan [Ex. 6]; Bryan Hannegan (Bryan.Hannegan@nrel.gov) [Bryan.Hannegan@nrel.gov]; bshireman@future500.org; [Ex. 6]; Carl Artman ([Ex. 6] [Ex. 6] carljc@stanford.edu; Catharine Ransom (cransom@gloverparkgroup.com) [cransom@gloverparkgroup.com]; Catrina Rorke (crorke@rstreet.org) [crorke@rstreet.org]; grizzle@grizzleco.com [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=607f0c9ada1547d0b72901f88202889c-grizzle@grizzleco.com]; Chris Wood (cwood@tu.org) [cwood@tu.org]; Christian Berle (cberle@edf.org) [cberle@edf.org]; Christy Plumer (cplumer@tnc.org) [cplumer@tnc.org]; ckearney@tfgnet.com; [Ex. 6] cli1 ([Personal Email / Ex. 6] Dan Nees (dnees@umd.edu) [dnees@umd.edu]; Daniel Botkin [Ex. 6] [mailing@danielbbotkin.com]; Daren Bakst (Daren.Bakst@heritage.org) [Daren.Bakst@heritage.org]; Dave White (dave@ecoexch.com) [dave@ecoexch.com]; David B. Struhs (david.struhs@domtar.com) [david.struhs@domtar.com]; David Gagner (Dave.Gagner@nfwf.org) [Dave.Gagner@nfwf.org]; David R. Anderson (Danderson@naturalresourceresults.com) [Danderson@naturalresourceresults.com]; David Schoenbrod (dschoenbrod@nyls.edu) [dschoenbrod@nyls.edu]; David Tenny (dtenny@nafoalliance.org) [dtenny@nafoalliance.org]; Doug Domenech [Ex. 6] [Ex. 6]; Doug Siglin (DSiglin@federalcitycouncil.org) [DSiglin@federalcitycouncil.org]; Eli Lehrer (elehrer@rstreet.org) [elehrer@rstreet.org]; Erik J. Meyers (emeyers@conservationfund.org) [emeyers@conservationfund.org]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Gerhard Kuska (Gerhard.Kuska@OceanStrategies.net) [Gerhard.Kuska@oceanstrategies.net]; gordon.binder@wwfus.org; Greg Schildwachter ([Ex. 6] [greg@[Ex. 6] [Ex. 6]; Hal Herring (herring@3rivers.net) [herring@3rivers.net]; hank@suntowater.com; Darwin, Henry [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=7ae8e9d24eeb4132b25982e358efbd9d-Darwin, Hen]; James Gulliford [Ex. 6] [Ex. 6] James L Connaughton (jim@jamesconnaughton.com) [jim@jamesconnaughton.com]; James M. Strock (jms@jamesstrock.com) [jms@jamesstrock.com]; James S. Burling Esq. (jsb@pacificlegal.org) [jsb@pacificlegal.org]; James T. Banks (james.banks@hoganlovells.com) [james.banks@hoganlovells.com]; Jan Goldman-Carter (goldmancarterj@nwf.org) [goldmancarterj@nwf.org]; Jessica L. Furey (jessica.furey@whitmanstrategygroup.com) [jessica.furey@whitmanstrategygroup.com]; Jim Gulliford [jim.gulliford@swcs.org]; Jim Mosher [Personal Email / Ex. 6] Jim Presswood (jpresswood@esalliance.org) [jpresswood@esalliance.org]; Joe Cascio Esq. (cascio@gwu.edu) [cascio@gwu.edu]; John L. Howard (John_L_Howard@DELL.com) [John_L_Howard@dell.com]; John Paul Woodley Jr. (jpwoodley@advantusstrategies.com) [jpwoodley@advantusstrategies.com]; Jonathan H. Adler (jha5@case.edu) [jha5@case.edu]; Kameran Onley (konley@tnc.org) [konley@tnc.org]; Kenneth von Schaumburg - Clark Hill PLC (kvonschaumburg@clarkhill.com) [kvonschaumburg@clarkhill.com]; Khary Cauthen (cauthenk@api.org) [cauthenk@api.org]; Kinnan Golemon (kg@kgstrategies.com) [kg@kgstrategies.com]; Leonard A. Leo Esq. (LLeo@fed-soc.org) [LLeo@fed-soc.org]; Lynn Broadus (Lbroaddus@BroadviewCollaborative.com) [Lbroaddus@broadviewcollaborative.com]; Lynn Scarlett (lscarlett@TNC.ORG) [lscarlett@tnc.org]; lynn.buhl@maryland.gov; Lyons, Troy [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=15e4881c95044ab49c6c35a0f5eef67e-Lyons, Troy]; Marcus Peacock [Ex. 6] [Ex. 6]; Marianne Horinko

(mhorinko@thehorinkogroup.org) [mhorinko@thehorinkogroup.org]; Mark van Putten (mvanputten@wegefoundation.org) [mvanputten@wegefoundation.org]; Marlo Lewis Jr. (marlo.lewis@cei.org) [marlo.lewis@cei.org]; Mary_B._Newmayr[Personal Privacy / Ex. 6]; Matthew Z. Leopold (mleopold@cfjblaw.com) [mleopold@cfjblaw.com]; Michael Cromartie (crom@eppc.org) [crom@eppc.org]; Michael Deane (michael@nawc.com) [michael@nawc.com]; Michael J. Catanzaro [Ex. 6] [Ex. 6] Shapiro, Mike [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=2c70af880ba747b5a8b6baa45a040125-MShapiro]; Mitchell J. Butler (mitchbutler@naturalresourceresults.com) [mitchbutler@naturalresourceresults.com]; Nancy Stoner (nstoner@piscesfoundation.org) [nstoner@piscesfoundation.org]; powell@clearpath.org; [Ex. 6] Reeder, John [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=aa56f6b0d507483fba530f3abbf6c94f-JREEDER]; Rick Otis ([Ex. 6] [Ex. 6]; rod@amconmag.com; Roger Scruton [Ex. 6] [Ex. 6]; Roy A. Hoagland Esq. (royhoagland@hopeimpacts.com) [royhoagland@hopeimpacts.com]; rsisson@conservamerica.org; Sara Tucker (sara@naturalresourceresults.com) [sara@naturalresourceresults.com]; [Ex. 6]; sean.mcginnis@thehorinkogroup.org; Seth A. Davis (sdavis@eliasgroup.com) [sdavis@eliasgroup.com]; Steve Hayward [Ex. 6] [Ex. 6] Steve Moyer (smoyer@tu.org) [smoyer@tu.org]; Steven Black [Ex. 6] [Ex. 6] Susan Dudley (sdudley@email.gwu.edu) [sdudley@email.gwu.edu]; [Ex. 6] Thomas J. Gibson - American Iron & Steel Institute (tgibson@steel.org) [tgibson@steel.org]; tmale@policyinnovation.org; Tom Sadler (tsadler@owaa.org) [tsadler@owaa.org]; tsadler@middlerivergroup.com; Wagner, Kenneth [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=048236ab99bc4d5ea16c139b1b67719c-Wagner, Ken]; William L. Wehrum (wwehrum@hunton.com) [wwehrum@hunton.com]; William Robert Irvin (birvin@americanrivers.org) [birvin@americanrivers.org]; Jackie Hardy [hardyj@nwf.org]; Collin O'Mara [Collin@nwf.org]; Ken Maynard [ken.maynard@earthandwatergroup.com]

Subject: Re: Stewardship Roundtable - September 14, 2017

Brent/Jim,

I will attend. Thank you. Alex

On Sun, Aug 20, 2017 at 10:47 AM, Brent Fewell <brent.fewell@earthandwatergroup.com> wrote:

> You are cordially invited to the next Stewardship Roundtable. We are pleased that Collin O'Mara, CEO and President of the National Wildlife Federation, will join the Roundtable to discuss NWF's top priorities and opportunities for advancing bipartisan conservation efforts during the current Administration.
>
> When: September 14, 8:30 a.m. – 9: 45 a.m.
>
> Where: NWF, 1200 G St. NW Suite 900
>
> RSVP to Brent Fewell, brent.fewell@earthandwatergroup.com
>
> Who Are We?
>
> ✓ We are a group of conservatives who care about the environment

✓ The Roundtable is a collegial forum of friends and colleagues who wish to change the tone and dialogue.

What is Our Goal?

✓ To promote a conservative ethic and solutions to environmental problems.

✓ To connect thoughtful center-left and center-right leaders.

✓ To engage in robust, civil dialogue in a confidential forum, identifying common ground and building consensus on policy solutions.

✓ To establish and build relationships, respectful of those with differing perspectives and views.

For more information, contact:

Brent Fewell, Founder, ConserveFewell.org, brent.fewell@earthandwatergroup.com, Ex. 6
Jim Presswood, President, Earth Stewardship Alliance, jpresswood@esalliance.org, Ex. 6

Brent Fewell, Esq. | Earth & Water Group
1455 Pennsylvania Ave., NW, Suite 400, Washington, DC 20004

Ex. 6 (o) | Ex. 6 (c) | www.earthandwatergroup.com

Earth & Water Law LLC
SOLUTIONS FOR BUSINESS AND THE PLANET

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--

Alex A. Beehler, President
Alex A. Beehler & Co., LLC
1050 K Street, N.W., Suite 400

Washington, DC 20001

Ex. 6

Message

From: Gale, Kat [Kat_Gale@afandpa.org]
Sent: 8/15/2017 2:26:22 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: RE: AF&PA Meeting Request for September 6 or 7, 2017

Thank you Mr. Forsgren. I look forward to speaking with Crystal when she calls.

Kat Gale
Senior Coordinator, Legal and Public Policy
Kat_Gale@afandpa.org
Ex. 6 (Phone)

From: Forsgren, Lee [mailto:Forsgren.Lee@epa.gov]
Sent: Saturday, August 12, 2017 2:31 PM
To: Gale, Kat <Kat_Gale@afandpa.org>
Cc: Noe, Paul <Paul_Noe@afandpa.org>; Penman, Crystal <Penman.Crystal@epa.gov>
Subject: Re: AF&PA Meeting Request for September 6 or 7, 2017

Kat,
Would be happy to meet with Paul and the AF&PA folks if possible on those dates. Crystal Penman will be in contact with you to see if something can be worked out.

Lee

Sent from my iPhone

On Aug 11, 2017, at 9:02 AM, Gale, Kat <Kat_Gale@afandpa.org> wrote:

> Dear Mr. Forsgren,
>
> Attached please find a request from Paul Noe, Vice President of Public Policy at the American Forest & Paper Association (AF&PA), for you to meet with AF&PA's Environment Resource Committee on the afternoon of September 6 or the morning of September 7, 2017.
>
> If you or your assistant would kindly reply to me with your availability, we would greatly appreciate it.
>
> Thank you in advance for your thoughtful consideration of AF&PA's meeting request.
>
> Kind regards,
>
> Kat Gale
>
> **Kat Gale**
> Senior Coordinator, Legal and Public Policy
> Kat_Gale@afandpa.org
> Ex. 6 (Phone)
> AMERICAN FOREST & PAPER ASSOCIATION
> 1101 K Street, N.W., Suite 700
> Washington, D.C. 20005
> <image001.jpg> <image002.jpg> <image003.jpg><image004.jpg><image005.jpg><image006.jpg>

<AFPA Meeting Request EPA - Forsgren 080717.pdf>

Message

From: Tracee Bentley [BentleyT@api.org]
Sent: 8/2/2017 11:27:34 PM
To: Davis, Patrick [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=7fca02d1ec544fbbbd6fb2e7674e06b2-Davis, Patr]
CC: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: Re: CO Ag Leadership Program

Thank you, Patrick. Lee I appreciate any assistance you are able to provide.

Patrick, I hope we get to meet soon. Many of my colleagues speak highly of you and I'm excited to talk about all of the opportunities.

Thanks again,
Tracee

Sent from my iPhone

> On Aug 2, 2017, at 2:44 PM, Davis, Patrick <davis.patrick@epa.gov> wrote:
>
> Hi Tracee,
>
> Melissa Simpson is one my favorite people.
>
> Please meet Lee Forsgren, Deputy Associate Administrator for the office of Water. Lee should be able to help you.
>
> Good to know about the Colorado Petroleum Council.
>
> All the best,
>
> Patrick Davis
> Environmental Protection Agency
> Deputy Associate Director, Office of Land and Emergency Management
> 202-564-3103 office
> Ex. 6 cell
>
> Emails sent to this address may be subject to FOIA.
>
> Sent from my iPhone
>
>> On Jul 24, 2017, at 5:43 PM, Tracee Bentley <BentleyT@api.org> wrote:
>>
>> Hi Patrick:
>> I asked my friend Melissa Simpson who to contact at EPA about visiting with this group in September about Waters of the United States and she said you would be the person to ask. A group of about 20 from Colorado, all poised to be leaders on rural issues in our state. I serve as the VP on the board and promised them I would try to help with a meeting. If you would point me to the right person, that would be fantastic.
>>
>> On another note, I run the Colorado Petroleum Council and if I can help you on oil & gas issues please do let me know.
>>
>> Thank you,
>> Tracee Bentley
>>
>> Sent from my iPhone
>>
>

Message

From: Tracee Bentley [BentleyT@api.org]
Sent: 8/2/2017 9:52:57 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: Automatic reply: CO Ag Leadership Program

Thank you for your email. I will be out of the office until August 7, 2017. If you need immediate assistance, please contact Mike Paules at Paulesm@api.org or Carrie Hackenberger at HackenbergerC@api.org.

Thank you,
Tracee

Message

From: Greg Southworth [greg@southworthconsulting.com]
Sent: 8/4/2017 7:37:27 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
CC: Timothy Charters [tcharters@noia.org]; Amy Emmert [emmerta@api.org]; evan@zimmerman-co.com; Connie Goers [CGoers@arenaoffshore.com]
Subject: Thank You for the Discussion

Mr. Forsgren -

Thank you for meeting with OOC, API and NOIA by phone on August 3 concerning the renewal of the Western Gulf of Mexico Offshore General Permit. As we discussed, we will keep you informed about the results of our meeting with Region 6 next week. We have a positive working relationship with Region 6 and are looking forward to a productive meeting. We will also check back in with you as agreed toward the end of August. In the meantime, we also appreciate your commitment to watch the development of this issue carefully, and to let us know as soon as possible if there is a reason we should expect offshore oil and natural gas operations in Region 6 to be disrupted. As you can imagine, our companies remain very concerned about continued operations, especially new exploration and development projects that may be planned after the permit expiration date. As you know, continued development of offshore energy resources is an important part of progressing our nation towards energy dominance and providing American jobs.

As discussed, we would like to offer some thoughts on a secondary plan to allow continued offshore development in the event the permit cannot be reissued before the current expiration date. One option for consideration would be to renew the permit for a shorter period of time (1-2 years) instead of the typical 5-year term. This would allow continuation of offshore operations and future development, while at the same time allowing comments and concerns to be addressed for permit renewal in the near future. EPA executed something similar in 1996 when the Western Gulf of Mexico Offshore General Permit was reissued for 1 year. In 1996, the General Permit expired on September 9, 1996 and was renewed with an expiration date of November 18, 1997 (*Federal Register Vol. 61, No. 155, August 9, 1996*).

We are looking forward to continuing the discussion. Thanks again for your time and consideration.

Greg Southworth
Associate Director
Offshore Operators Committee

Ex. 6

greg@offshoreoperators.com

2400 Veterans Memorial Blvd, Suite 206
Kenner, Louisiana 70062

www.theooc.us

Message

From: Penman, Crystal [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=93662678A6FD4D4695C3DF22CD95935A-PENMAN, CRYSTAL]
Sent: 8/18/2017 2:00:39 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Davis, Patrick [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=7fca02d1ec544fbbbd6fb2e7674e06b2-Davis, Patr]; Tracee Bentley [BentleyT@api.org]
Subject: RE: CO Ag Leadership Program

Lee Forsgren has the following availability:

8/21 – 9a, 10a, 11, 3p
8/22 – 9a, 10, 11, 3p
8/23 – 3p, 4p
8/24 – 11a

Please advise.

Crystal Penman
Program Specialist
Office of Water
Immediate Office
U.S. Environmental Protection Agency
Work: 202-564-3318
Penman.Crystal@epa.gov

-----Original Message-----
From: Forsgren, Lee
Sent: Wednesday, August 2, 2017 5:53 PM
To: Davis, Patrick <davis.patrick@epa.gov>; Tracee Bentley <BentleyT@api.org>
Cc: Penman, Crystal <Penman.Crystal@epa.gov>
Subject: RE: CO Ag Leadership Program

Hi Tracee,

I would be happy to speak with you about WOTUS and meet with you if you would so desire. Am including Crystal Penman who handles my schedule so she can find some time for us to talk or possibly meet over the next couple of weeks.

Regards,
Lee

D. Lee Forsgren
Deputy Assistant Administrator
Office Of Water
Environmental Protection Agency
1200 Pennsylvania Avenue, VW
Room 3219 WJCE
Washington, DC 20460
Phone: 202-564-5700
Forsgren.Lee@epa.gov

-----Original Message-----
From: Davis, Patrick
Sent: Wednesday, August 2, 2017 4:44 PM
To: Tracee Bentley <BentleyT@api.org>
Cc: Forsgren, Lee <Forsgren.Lee@epa.gov>
Subject: Re: CO Ag Leadership Program

Hi Tracee,

Melissa Simpson is one my favorite people.

Please meet Lee Forsgren, Deputy Associate Administrator for the office of Water. Lee should be able to help you.

Good to know about the Colorado Petroleum Council.

All the best,

Patrick Davis
Environmental Protection Agency
Deputy Associate Director, Office of Land and Emergency Management
202-564-3103 office
Ex. 6 cell

Emails sent to this address may be subject to FOIA.

Sent from my iPhone

> On Jul 24, 2017, at 5:43 PM, Tracee Bentley <BentleyT@api.org> wrote:
>
> Hi Patrick:
> I asked my friend Melissa Simpson who to contact at EPA about visiting with this group in September about Waters of the United States and she said you would be the person to ask. A group of about 20 from Colorado, all poised to be leaders on rural issues in our state. I serve as the VP on the board and promised them I would try to help with a meeting. If you would point me to the right person, that would be fantastic.
>
> On another note, I run the Colorado Petroleum Council and if I can help you on oil & gas issues please do let me know.
>
> Thank you,
> Tracee Bentley
>
> Sent from my iPhone
>

Message

From: Noe, Paul [Paul_Noe@afandpa.org]
Sent: 8/12/2017 6:31:34 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: Automatic reply: AF&PA Meeting Request for September 6 or 7, 2017

I will be away from the office until Tuesday, Aug. 22, with limited email access and will respond to your message when I return. If you need immediate assistance, please contact Kat Gale at Kat_Gale@afandpa.org

Thank you.

Message

From: Gale, Kat [Kat_Gale@afandpa.org]
Sent: 8/11/2017 7:01:33 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
CC: Noe, Paul [Paul_Noe@afandpa.org]
Subject: AF&PA Meeting Request for September 6 or 7, 2017
Attachments: AFPA Meeting Request EPA - Forsgren 080717.pdf

Dear Mr. Forsgren,

Attached please find a request from Paul Noe, Vice President of Public Policy at the American Forest & Paper Association (AF&PA), for you to meet with AF&PA's Environment Resource Committee on the afternoon of September 6 or the morning of September 7, 2017.

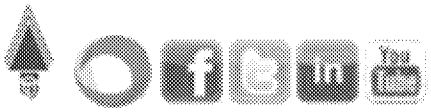
If you or your assistant would kindly reply to me with your availability, we would greatly appreciate it.

Thank you in advance for your thoughtful consideration of AF&PA's meeting request.

Kind regards,

Kat Gale

Kat Gale
Senior Coordinator, Legal and Public Policy
Kat_Gale@afandpa.org
Ex. 6 Phone)
AMERICAN FOREST & PAPER ASSOCIATION
1101 K Street, N.W., Suite 700
Washington, D.C. 20005



American
Forest & Paper
Association

August 11, 2017

Mr. Dennis Lee Forsgren, Jr.
Deputy Assistant Administrator
Office of Water
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
MC 4101M
Washington, DC 20460

Dear Mr. Forsgren:

On behalf of the American Forest & Paper Association (AF&PA), I am writing to request a meeting with you to discuss the industry's current regulatory reform priorities with a group of our member company executives from across the country. Members of our Environment Resource Committee will be in Washington, DC and available to meet with you the afternoon of Wednesday, September 6 and the morning of Thursday, September 7.

AF&PA represents U.S. manufacturers of pulp, paper, packaging, tissue and wood products with fact-based public policy and marketplace advocacy. More than 75 percent of forest products industry facilities are located in predominantly rural counties across America and are often the economic driver for their communities, large and small. The approximately 900,000 family wage jobs represent a $50 billion annual payroll, making our industry among the top 10 manufacturing sector employers in 45 states. AF&PA member companies make products essential for everyday life from renewable and recyclable resources and are committed to continuous improvement through the industry's sustainability initiative - *Better Practices, Better Planet 2020*.

We will be in touch with your office shortly, but in the meantime, please feel free to have your staff contact Kat Gale at Ex. 6 or Kat_Gale@afandpa.org with your availability on September 6 or 7. Thank you for your consideration.

Best regards,

Paul R. Noe
Vice President for Public Policy

1101 K Street, N.W., Suite 700 • Washington, D.C. 20005 • (202) 463-2700 • afandpa.org

BETTER PRACTICES BETTER PLANET 2020
Continuing AF&PA's Commitment to Sustainability

Message

From: Schwartz, Jerry [Jerry_Schwartz@afandpa.org]
Sent: 7/26/2017 9:39:38 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Lousberg, Macara [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=e589fdabe6374c5987d0184b43fb5c57-MLousber]
CC: Noe, Paul [Paul_Noe@afandpa.org]; Garber, Rich D [RichGarber@packagingcorp.com]; Roberto A. Artiga (roberto.artiga@kapstonepaper.com) [roberto.artiga@kapstonepaper.com]; Mayes Starke (mayes.starke@gapac.com) [mayes.starke@gapac.com]; Reitter, Annabeth [Annabeth.Reitter@domtar.com]; Wiegand, Paul [pwiegand@ncasi.org]
Subject: Follow Up Material from Today's Meeting
Attachments: HDR Cost Report Aug 08[1] copy.pdf; HDR Press Release 12.5.13[2].docx; AWB - HDR Toxics Technology Report - Final 11-7-2013[2] copy.pdf; Larry Walker WQBudgetLegReport2016.pdf; Follow up Slides for Forsgren meeting.pptx

Dear Lee and Macara,

Thank you for taking the time to meet with us this morning. Below and attached is the information you requested, as well as some additional information.

I. Costs for Compliance with Maine Human Health Water Quality Criteria (HHWQC). You are correct that Maine dischargers did not conduct their own cost study, as was the case in WA and OR (discussed below). However, we note that the EPA cost study for Maine HHWQC compliance was extremely limited in terms of the pollutants for which cost estimates were derived. For example, the study did not consider PCB compliance costs at all and the only pollutant examined for the relevant pulp and paper mill was mercury (EPA assumed virtually no compliance costs for the mill, assuming it would only have to undertake a pollutant minimization plan). We think it is likely that dischargers could exceed permit limits for other pollutants based on the more stringent HHWQC included in the final EPA federal rule. Moreover, we note that other aspects of the federal rule for Maine (e.g., bacteria criteria) would impose costs on dischargers.

II. Cost study in OR: The attached "August 08" file documents costs for pulp and paper mill compliance with the Oregon HHWQC. Note that we have focused our discussion on costs for PCBs, as that is the pollutant that is largely responsible for the significant costs we have documented. We should make clear, however, that PCBs are NOT an issue unique to the pulp and paper industry. The industry doesn't use PCBs in the manufacturing process, but they enter the process from outside sources (wood, water, recovered paper, etc.) because of ubiquitous legacy contamination. Essentially, all ambient waters in the U.S. will exceed the federal Washington rule criterion of 7 parts per quadrillion (ppq) using Method 1668, and this level is not achievable in any effluent/runoff from any source. Indeed, even many laboratory blanks contain PCBs above that level.

Here is the key point from the summary of the study on page 3:

> Costs [in the table on page 3] provided above represent only four of the eight large mills located in Oregon. The cost related to simply installing technology to meet revised HHWQC at increased FCRs is significant and *would cost the Oregon pulp and paper industry in excess of $500 million.* In addition, *annual costs to operate these technologies would cost Oregon pulp and paper mills in the range of $30 to $90 million annually.* (Emphasis added).

III. Cost Study in WA: In December 2013, a broad-based coalition of industry and local government entities issued a new HDR report, based on the same methodology as the OR report, documenting their members' compliance costs with the *state's* proposed HHWQC (see attached AWB report and press release). Importantly, those criteria were less stringent than the final EPA federal criteria and

thus compliance costs for the EPA final rule would be *even greater* than those outlined in the HDR evaluation. Table 1 on page ES-3 provides the cost estimate in the billions of dollars for various treatment technologies, but as we stated, even those expenditures would not guarantee compliance.

Note that in contrast, the EPA cost analysis projected virtually no compliance costs on the assumption that dischargers would simply obtain variances or compliance schedules. This is an unfounded assumption as those implementation tools are costly and difficult to obtain (as you heard from the Wisconsin example), and only delay the inevitable cost expenditure, as compliance is required at the termination of the variance or compliance schedule. Furthermore, variances, extended compliance schedules and other unproven implementation tools leave municipal and industrial permittees and state agencies open to costly and resource-intensive litigation.

IV. Permitting Status in OR: We can state unequivocally that the industry is not "living with" the OR criteria. No pulp and paper mill NPDES permits have been issued based on the OR HHWQC and we believe that is the case for all major dischargers in the state. Indeed, NPDES permitting in OR has slowed considerably and caused significant backlogs for a variety of reasons, including the HHWQC. This prompted the legislature to require the state environmental agency to commission a study to examine the problem. That report (see "Larry Walker..." file attached) found a variety of problems contributed to the backlog, including, '[t]he difficulty for some dischargers to meet water quality standards, requiring complex regulatory solutions and/or expensive engineering." (Report, page 2).

An earlier draft of the Walker report included an even more direct statement regarding permitting status that we believe better reflects the current permitting status in Oregon:

"A number of the stakeholders indicate the adoption of new water quality standards or changes to existing standards as a result of either litigation or EPA disapprovals has had an ongoing disruptive effect on the renewal of wastewater NPDES permits in Oregon. These events, and, in some cases, the absence of an effective response to these events in terms of direction to NPDES permit writers, has contributed to significant delays in NPDES permitting, and increased NPDES permit backlog. After analysis it became clear that, despite the recognition of this problem, effective strategies or processes are not in place to deal with the long term effect of current and future water quality standards, 303-d listings and resulting TMDL wasteload allocations on the NPDES permitting program.

In addition, indications that the NPDES permitting process is not consistently aligned with EPA and DEQ legal requirements are illustrated in a recent document and in feedback received from various stakeholders. Failure to address such deficiencies affects the NPDES permit renewal backlog, as rework is required to meet legal requirements while an NPDES permit remains incomplete."

V. Risk Slides (discussed individually)

a. Risk Comparison: This slide compares various risks of dying versus the hypothetical risk of contracting cancer under several EPA policies and rules. The key point for Washington is that by overriding the 2000 Methodology and protecting high consuming tribes at the 10^{-6} risk level, the criteria protect the general population of Washington at 10^{-8} — resulting in incredibly stringent, expensive, and unachievable permit limits. Moreover, those risks are much more remote than those in other EPA rules and programs, and those of other agencies.

b. Compounded Conservatism: The slide demonstrates the extremely conservative nature of the national HHWQC. The equation deriving the criteria assumes everyone has ALL of the characteristics in the second column in the slide. It is not likely that anyone has all these characteristics, yet this is the basis for the national HHWQC. The WA and ME criteria are even more conservative, assuming higher fish consumption rates.

c. Risk Levels: This slide demonstrates there is no measurable human health benefit of insisting on protecting the tribes at a 10^{-6} risk level, as the EPA now requires. Because the risk levels look at *excess* risk over the baseline, the theoretical risks of cancer from implementation of HHWQC based on various risk levels differ by decimal points, and are certainly not measurable. Yet, as discussed, these risk level decisions have a dramatic impact on the cost of compliance for both state agencies and permitted industrial and municipal sources.

KEY POINT: We understand that tribal treaty rights raise complicated legal issues. The Washington petition we filed and the Maine amended complaint provide well-reasoned arguments why those treaties don't require EPA's new policies that override cooperative federalism, and reject state HHWQC.

Even if one believes that those treaties do require special protection of tribal treaty rights (which we don't), there is no basis for EPA to determine that this requires the EPA-mandated HHWQC (including setting a 10^{-6} risk level for high consuming subpopulations such as the tribes) to protect those rights. As these slides demonstrate, the national HHWQC are incredibly protective as they are based on extremely conservative assumptions. Further, there is no measurable benefit from criteria based on the different risk levels depicted. Finally, our WA petition for reconsideration demonstrates that EPA has always viewed risks resulting from criteria set at 10^{-6}, 10^{-5} and 10^{-4} to be de minimis, and a new policy determining that only a 10^{-6} risk level is protective would be a radical change in policy with implications for other risk programs in EPA and in other agencies.

VI. Additional Reading: Finally, here is a link to a blog and an article I wrote that was published in BNA Bloomberg. It is based on a lot of work by NCASI and others. It is rather lengthy, but it provides a (hopefully) easy to understand explanation of the issues involved.

Thanks again for your time today, and we would be happy to provide any additional information. Jerry

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Treatment Technology Review and Assessment

Association of Washington Business
Association of Washington Cities
Washington State Association of Counties

November 7, 2013

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Appendix A - Unit Process Sizing Criteria
Appendix B - Greenhouse Gas Emissions Calculation Assumptions

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Acronyms

AACE	Association for the Advancement of Cost Engineering
AOP	advanced oxidation processes
AWB	Association of Washington Businesses
BAC	biological activated carbon
BAP	benzo(a)pyrene
BOD	biochemical oxygen demand
BTU	British thermal unit
CEPT	Chemically-enhanced primary treatment
cf	cubic feet
CIP	clean in place
CRITFC	Columbia River Inter-Tribal Fish Commission
Ecology	Washington Department of Ecology
EPA	U.S. Environmental Protection Agency
FCR	fish consumption rate
g/day	grams per day
GAC	granular activated carbon
gal	gallon
gfd	gallons per square foot per day
GHG	greenhouse gas
gpd	gallons per day
gpm	gallons per minute
GWh	giga watt hours
HDR	HDR Engineering, Inc.
HHWQC	human health water quality criteria
HRT	hydraulic residence time
IPCC	Intergovernmental Panel on Climate Change
kg	kilogram
KWh/MG	kilowatt-hours per million gallons
lb	pound
MBR	membrane bioreactor
MCL	maximum contaminant level
MF	microfiltration
mgd	million gallons per day
mg/L	milligrams per liter
MMBTU	million British thermal units
MWh/d	megawatt-hours per day
NF	nanofiltration
ng/L	nanograms per liter
NPDES	National Pollutant Discharge Elimination System
NPV	net present value
O&M	operations and maintenance
ODEQ	Oregon Department of Environmental Quality
PAC	powdered activated carbon
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyls
PE	population equivalents
pg/L	picograms per liter
PIX	potable ion exchange

ppm	parts per million
RO	reverse osmosis
SDWA	Safe Drinking Water Act
sf	square feet
SGSP	salinity gradient solar pond
SRT	solids retention time
Study Partners	Association of Washington Businesses/Association of Washington Cities and Washington State Association of Counties consortium
TDS	total dissolved solids
TMDL	total maximum daily load
TSS	total suspended solids
UF	ultrafiltration
µg/L	micrograms per liter
USDA	U.S. Department of Agriculture
UV	ultraviolet
WAC	Washington Administrative Code
WAS	waste activated sludge
WLA	waste load allocation
WWTP	wastewater treatment plant
ZLD	zero liquid discharge

Executive Summary

This study evaluated treatment technologies potentially capable of meeting the State of Washington Department of Ecology's (Ecology) revised effluent discharge limits associated with revised human health water quality criteria (HHWQC). HDR Engineering, Inc. (HDR) completed a literature review of potential technologies and an engineering review of their capabilities to evaluate and screen treatment methods for meeting revised effluent limits for four constituents of concern: arsenic, benzo(a)pyrene (BAP), mercury, and polychlorinated biphenyls (PCBs). HDR selected two alternatives to compare against an assumed existing baseline secondary treatment system utilized by dischargers. These two alternatives included enhanced secondary treatment with membrane filtration/reverse osmosis (MF/RO) and enhanced secondary treatment with membrane filtration/granulated activated carbon (MF/GAC). HDR developed capital costs, operating costs, and a net present value (NPV) for each alternative, including the incremental cost to implement improvements for an existing secondary treatment facility.

Currently, there are no known facilities that treat to the HHWQC and anticipated effluent limits that are under consideration. Based on the literary review, research, and bench studies, the following conclusions can be made from this study:

- Revised HHWQC based on state of Oregon HHWQC (2001) and U.S. Environmental Protection Agency (EPA) "National Recommended Water Quality Criteria" will result in very low water quality criteria for toxic constituents.
- There are limited "proven" technologies available for dischargers to meet required effluent quality limits that would be derived from revised HHWQC.
    - Current secondary wastewater treatment facilities provide high degrees of removal for toxic constituents; however, they are not capable of compliance with water quality-based National Pollutant Discharge Elimination System (NPDES) permit effluent limits derived from the revised HHWQC.
    - Advanced treatment technologies have been investigated and candidate process trains have been conceptualized for toxics removal.
        - Advanced wastewater treatment technologies may enhance toxics removal rates; however, they will not be capable of compliance with HHWQC-based effluent limits for PCBs. The lowest levels achieved based on the literature review were between <0.00001 and 0.00004 micrograms per liter (µg/L), as compared to a HHWQC of 0.0000064 µg/L.
        - Based on very limited performance data for arsenic and mercury from advanced treatment information available in the technical literature, compliance with revised criteria may or may not be possible, depending upon site specific circumstances.
            - Compliance with a HHWQC for arsenic of 0.018 µg/L appears unlikely. Most treatment technology performance information available in the literature is based on drinking water treatment applications targeting a much higher Safe Drinking Water Act (SDWA) maximum contaminant level (MCL) of 10 µg/L.
            - Compliance with a HHWQC for mercury of 0.005 µg/L appears to be potentially attainable on an average basis, but perhaps not if effluent limits are structured on a maximum monthly, maximum

weekly or maximum daily basis. Some secondary treatment facilities attain average effluent mercury levels of 0.009 to 0.066 µg/L. Some treatment facilities with effluent filters attain average effluent mercury levels of 0.002 to 0.010 µg/L. Additional advanced treatment processes are expected to enhance these removal rates, but little mercury performance data is available for a definitive assessment.

        - Little information is available to assess the potential for advanced technologies to comply with revised BAP criteria.
    - Some technologies may be effective at treating identified constituents of concern to meet revised limits while others may not. It is therefore even more challenging to identify a technology that can meet all constituent limits simultaneously.
    - A HHWQC that is one order-of-magnitude less stringent could likely be met for mercury and BAP; however, it appears PCB and arsenic limits would not be met.
- Advanced treatment processes incur significant capital and operating costs.
    - Advanced treatment process to remove additional arsenic, BAP, mercury, and PCBs would combine enhancements to secondary treatment with microfiltration membranes and reverse osmosis or granular activated carbon and increase the estimated capital cost of treatment from $17 to $29 in dollars per gallon per day of capacity (based on a 5.0-million-gallon-per-day (mgd) facility).
    - The annual operation and maintenance costs for the advanced treatment process train will be substantially higher (approximately $5 million - $15 million increase for a 5.0 mgd capacity facility) than the current secondary treatment level.
- Implementation of additional treatment will result in additional collateral impacts.
    - High energy consumption.
    - Increased greenhouse gas emissions.
    - Increase in solids production from chemical addition to the primaries. Additionally, the membrane and GAC facilities will capture more solids that require handling.
- It appears advanced treatment technology alone cannot meet all revised water quality limits and implementation tools are necessary for discharger compliance.
    - Implementation flexibility will be necessary to reconcile the difference between the capabilities of treatment processes and the potential for HHWQC driven water quality based effluent limits to be lower than attainable with technology

Table 1 indicates that the unit NPV cost for baseline conventional secondary treatment ranges from $13 to $28 per gallon per day of treatment capacity. The unit cost for the advanced treatment alternatives increases the range from the low $20s to upper $70s on a per gallon per-day of treatment capacity. The resulting unit cost for improving from secondary treatment to advanced treatment ranges between $15 and $50 per gallon per day of treatment capacity. Unit costs were also evaluated for both a 0.5 and 25 mgd facility. The range of unit costs for improving a 0.5 mgd from secondary to advanced treatment is $60 to $162 per gallon per day of

treatment capacity. The range of unit costs for improving a 25 mgd from secondary to advanced treatment is $10 to $35 per gallon per day of treatment capacity.

Table 1. Treatment Technology Costs in 2013 Dollars for a 5-mgd Facility

Alternative	Total Construction Cost, 2013 dollars ($ Million)	O&M Net Present Value, 2013 dollars ($ Million) ***	Total Net Present Value, 2013 dollars ($ Million)	NPV Unit Cost, 2013 dollars ($/gpd)
Baseline (Conventional Secondary Treatment) *	59 - 127	5 - 11	65 - 138	13 - 28
Incremental Increase to Advanced Treatment - MF/RO	48 - 104	26 - 56	75 - 160	15 - 32
Advanced Treatment - MF/RO **	108 - 231	31 - 67	139 - 298	28 - 60
Incremental Increase to Advanced Treatment - MF/GAC	71 - 153	45 - 97	117 - 250	23 - 50
Advanced Treatment - MF/GAC	131 - 280	50 - 108	181 - 388	36 - 78

* Assumed existing treatment for dischargers. The additional cost to increase the SRT to upwards of 30-days is about $12 - 20 million additional dollars in total project cost for a 5 mgd design flow.

** Assumes zero liquid discharge for RO brine management, followed by evaporation ponds. Other options are available as listed in Section 4.4.2.

*** Does not include the cost for labor.

mgd=million gallons per day
MG=million gallons
O&M=operations and maintenance
Net Present Value = total financed cost assuming a 5% nominal discount rate over an assumed 25 year equipment life.

Costs presented above are based on a treatment capacity of 5.0 mgd, however, existing treatment facilities range dramatically across Washington in size and flow treated. The key differences in cost between the baseline and the advanced treatment MF/RO are as follows:

- Larger aeration basins than the baseline to account for the longer SRT (>8 days versus <8 days).
- Additional pumping stations to pass water through the membrane facilities and granulated activated carbon facilities. These are based on peak flows.
- Membrane facilities (equipment, tanks chemical feed facilities, pumping, etc.) and replacement membrane equipment.
- Granulated activated carbon facilities (equipment, contact tanks, pumping, granulated activated carbon media, etc.)
- Additional energy and chemical demand to operate the membrane and granulated activated carbon facilities
- Additional energy to feed and backwash the granulated activated carbon facilities.
- Zero liquid discharge facilities to further concentrate the brine reject.
    - Zero liquid discharge facilities are energy/chemically intensive and they require membrane replacement every few years due to the brine reject water quality.

- Membrane and granulated activated carbon media replacement represent a significant maintenance cost.
- Additional hauling and fees to regenerate granulated activated carbon off-site.

The mass of pollutant removal by implementing advanced treatment was calculated based on reducing current secondary effluent discharges to revised effluent limits for the four pollutants of concern. These results are provided in Table 2 as well as a median estimated unit cost basis for the mass of pollutants removed.

Table 2. Unit Cost by Contaminant for a 5-mgd Facility Implementing Advanced Treatment using Membrane Filtration/Reverse Osmosis

Component	PCBs	Mercury	Arsenic	BAPs
Required HHWQC based Effluent Quality (µg/L)	0.0000064	0.005	0.018	0.0013
Current Secondary Effluent Concentration (µg/L)	0.002	0.025	7.5	0.006
Total Mass Removed (lbs) over 25 year Period	0.76	7.6	2,800	1.8
Median Estimated Unit Cost (NPV per total mass removed in pounds over 25 years)	$290,000,000	$29,000,000	$77,000	$120,000,000

Collateral adverse environmental impacts associated with implementing advanced treatment were evaluated. The key impacts from this evaluation include increased energy use, greenhouse gas production, land requirements and treatment residuals disposal. Operation of advanced treatment technologies could increase electrical energy by a factor of 2.3 to 4.1 over the baseline secondary treatment system. Direct and indirect greenhouse gas emission increases are related to the operation of advanced treatment technologies and electrical power sourcing, with increases of at least 50 to 100 percent above the baseline technology. The energy and air emission implications of advanced treatment employing granulated activated carbon construction of advanced treatment facilities will require additional land area. The availability and cost of land adjacent to existing treatment facilities has not been included in cost estimates, but could be very substantial. It is worthwhile noting residual materials from treatment may potentially be hazardous and their disposal may be challenging to permit. Costs assume zero liquid discharge from the facilities.

1.0 Introduction

Washington's Department of Ecology (Ecology) has an obligation to periodically review waterbody "designated uses" and to modify, as appropriate, water quality standards to ensure those uses are protected. Ecology initiated this regulatory process in 2009 for the human health-based water quality criteria (HHWQC) in Washington's *Surface Water Quality Standards* (Washington Administrative Code [WAC] 173-201A). HHWQC are also commonly referred to as "toxic pollutant water quality standards." Numerous factors will influence Ecology's development of HHWQC. The expectation is that the adopted HHWQC will be more stringent than current adopted criteria. National Pollutant Discharge Elimination System (NPDES) effluent limits for permitted dischargers to surface waters are based on U.S. Environmental Protection Agency (EPA) and state guidance. Effluent limits are determined primarily from reasonable potential analyses and waste load allocations (WLAs) from total maximum daily loads (TMDLs), although the permit writer may use other water quality data. Water quality-based effluent limits are set to be protective of factors, including human health, aquatic uses, and recreational uses. Therefore, HHWQC can serve as a basis for effluent limits. The presumption is that more stringent HHWQC will, in time, drive lower effluent limits. The lower effluent limits will require advanced treatment technologies and will have a consequent financial impact on NPDES permittees. Ecology anticipates that a proposed revision to the water quality standards regulation will be issued in first quarter 2014, with adoption in late 2014.

The Association of Washington Businesses (AWB) is recognized as the state's chamber of commerce, manufacturing and technology association. AWB members, along with the Association of Washington Cities and Washington State Association of Counties (collectively referred to as Study Partners), hold NPDES permits authorizing wastewater discharges. The prospect of more stringent HHWQC, and the resulting needs for advanced treatment technologies to achieve lower effluent discharge limits, has led this consortium to sponsor a study to assess technology availability and capability, capital and operations and maintenance (O&M) costs, pollutant removal effectiveness, and collateral environmental impacts of candidate technologies.

The "base case" for the study began with the identification of four nearly ubiquitous toxic pollutants present in many industrial and municipal wastewater discharges, and the specification of pollutant concentrations in well-treated secondary effluent. The pollutants are arsenic, benzo(a)pyrene (BAP), mercury and polychlorinated biphenyls (PCBs), which were selected for review based on available monitoring data and abundant presence in the environment. The purpose of this study is to review the potential water quality standards and associated treatment technologies able to meet those standards for four pollutants.

A general wastewater treatment process and wastewater characteristics were used as the common baseline for comparison with all of the potential future treatment technologies considered. An existing secondary treatment process with disinfection at a flow of 5 million gallons per day (mgd) was used to represent existing conditions. Typical effluent biochemical oxygen demand (BOD) and total suspended solids (TSS) were assumed between 10 and 30 milligrams per liter (mg/L) for such a facility and no designed nutrient or toxics removal was assumed for the baseline existing treatment process.

Following a literature review of technologies, two advanced treatment process options for toxics removal were selected for further evaluation based on the characterization of removal effectiveness from the technical literature review and Study Partners' preferences. The two tertiary treatment options are microfiltration membrane filtration (MF) followed by either reverse osmosis (RO) or granular activated carbon (GAC) as an addition to an existing secondary treatment facility.

The advanced treatment technologies are evaluated for their efficacy and cost to achieve the effluent limitations implied by the more stringent HHWQC. Various sensitivities are examined, including for less stringent adopted HHWQC, and for a size range of treatment systems. Collateral environmental impacts associated with the operation of advanced technologies are also qualitatively described.

2.0 Derivation of the Baseline Study Conditions and Rationale for Selection of Effluent Limitations

2.1 Summary of Water Quality Criteria

Surface water quality standards for toxics in the State of Washington are being updated based on revised human fish consumption rates (FCRs). The revised water quality standards could drive very low effluent limitations for industrial and municipal wastewater dischargers. Four pollutants were selected for study based on available monitoring data and abundant presence in the environment. The four toxic constituents are arsenic, BAP, mercury, and PCBs.

2.2 Background

Ecology is in the process of updating the HHWQC in the state water quality standards regulation. Toxics include metals, pesticides, and organic compounds. The human health criteria for toxics are intended to protect people who consume water, fish, and shellfish. FCRs are an important factor in the derivation of water quality criteria for toxics.

The AWB/City/County consortium (hereafter "Study Partners") has selected four pollutants for which more stringent HHWQC are expected to be promulgated. The Study Partners recognize that Ecology probably will not adopt more stringent arsenic HHWQC so the evaluation here is based on the current arsenic HHWQC imposed by the National Toxics Rule. Available monitoring information indicates these pollutants are ubiquitous in the environment and are expected to be present in many NPDES discharges. The four pollutants include the following:

- Arsenic
  - Elemental metalloid that occurs naturally and enters the environment through erosion processes. Also widely used in batteries, pesticides, wood preservatives, and semiconductors. Other current uses and legacy sources in fungicides/herbicides, copper smelting, paints/dyes, and personal care products.

- Benzo(a)pyrene (BAP)
  - Benzo(a)pyrene is a polycyclic aromatic hydrocarbon formed by a benzene ring fused to pyrene as the result of incomplete combustion. Its metabolites are highly carcinogenic. Sources include wood burning, coal tar, automobile exhaust, cigarette smoke, and char-broiled food.

- Mercury
  - Naturally occurring element with wide legacy uses in thermometers, electrical switches, fluorescent lamps, and dental amalgam. Also enters the environment through erosion processes, combustion (especially coal), and legacy industrial/commercial uses. Methylmercury is an organometallic that is a bioaccumulative toxic. In aquatic systems, an anaerobic methylation process converts inorganic mercury to methylmercury.

- Polychlorinated Biphenyls (PCBs)
  - Persistent organic compounds historically used as a dielectric and coolant in electrical equipment and banned from production in the U.S. in 1979. Available information indicates continued pollutant loadings to the environment as a byproduct from the use of some pigments, paints, caulking, motor oil, and coal combustion.

2.3 Assumptions Supporting Selected Ambient Water Quality Criteria and Effluent Limitations

Clean Water Act regulations require NPDES permittees to demonstrate their discharge will "not cause or contribute to a violation of water quality criteria." If a "reasonable potential analysis" reveals the possibility of a standards violation, the permitting authority is obliged to develop "water quality-based effluent limits" to ensure standards achievement. In addition, if ambient water quality monitoring or fish tissue assessments reveal toxic pollutant concentrations above HHWQC levels, Ecology is required to identify that impairment ("303(d) listing") and develop corrective action plans to force reduction in the toxic pollutant discharge or loading of the pollutant into the impaired water body segment. These plans, referred to as total maximum daily loads (TMDLs) or water cleanup plans, establish discharge allocations and are implemented for point discharge sources through NPDES permit effluent limits and other conditions.

The effect of more stringent HHWQC will intuitively result in more NPDES permittees "causing or contributing" to a water quality standards exceedance, and/or more waterbodies being determined to be impaired, thus requiring 303(d) listing, the development of TMDL/water cleanup plans, and more stringent effluent limitations to NPDES permittees whose treated wastewater contains the listed toxic pollutant.

The study design necessarily required certain assumptions to create a "baseline effluent scenario" against which the evaluation of advanced treatment technologies could occur. The Study Partners and HDR Engineering, Inc (HDR) developed the scenario. Details of the baseline effluent scenario are presented in Table 3. The essential assumptions and rationale for selection are presented below:

- Ecology has indicated proposed HHWQC revisions will be provided in first quarter 2014. A Study Partners objective was to gain an early view on the treatment technology and cost implications. Ecology typically allows 30 or 45 days for the submission of public comments on proposed regulations. To wait for the proposed HHWQC revisions would not allow sufficient time to complete a timely technology/cost evaluation and then to share the study results in the timeframe allowed for public involvement/public comments.
- Coincident with the issuance of the proposed regulation, Ecology has a statutory obligation to provide a Significant Legislative Rule evaluation, one element of which is a "determination whether the probable benefits of the rule are greater than its probable costs, taking into account both the qualitative and quantitative benefits and costs and the specific directives of the statute being implemented" (RCW 34.05.328(1)(d)). A statutory requirement also exists to assess the impact of the proposed regulation to small businesses. The implication is that Ecology will be conducting these economic evaluations in fourth quarter 2013 and early 2014. The Study Partners wanted to have a completed technology/cost study available to share with Ecology for their significant legislative rule/small business evaluations.
- The EPA, Indian tribes located in Washington, and various special interest groups have promoted the recently promulgated state of Oregon HHWQC (2011) as the "model" for Washington's revisions of HHWQC. The Oregon HHWQC are generally based on a increased FCR of 175 grams per day (g/day) and an excess cancer risk of 10^{-6}. While the Study Partners do not concede the wisdom or appropriateness of the Oregon criteria, or the selection of scientific/technical elements used to derive those criteria, the Study Partners nevertheless have selected the Oregon HHWQC as a viable "starting point" upon which this study could be based.

- The scenario assumes generally that Oregon's HHWQC for ambient waters will, for some parameters in fact, become effluent limitations for Washington NPDES permittees. The reasoning for this important assumption includes:
    - The state of Washington's NPDES permitting program is bound by the *Friends of Pinto Creek vs. EPA* decision in the United States Court of Appeals for the Ninth Circuit (October 4, 2007). This decision held that no NPDES permits authorizing new or expanded discharges of a pollutant into a waterbody identified as impaired; i.e., listed on CWA section 303(d), for that pollutant, may be issued until such time as "existing dischargers" into the waterbody are "subject to compliance schedules designed to bring the (waterbody) into compliance with applicable water quality standards." In essence, any new/expanded discharge of a pollutant causing impairment must achieve the HHWQC at the point of discharge into the waterbody.
    - If a waterbody segment is identified as "impaired" (i.e., not achieving a HHWQC), then Ecology will eventually need to produce a TMDL or water cleanup plan. For an existing NPDES permittee with a discharge of the pollutant for which the receiving water is impaired, the logical assumption is that any waste load allocation granted to the discharger will be at or lower than the numeric HHWQC (to facilitate recovery of the waterbody to HHWQC attainment). As a practical matter, this equates to an effluent limit established at the HHWQC.
    - Acceptance of Oregon HHWQC as the baseline for technology/cost review also means acceptance of practical implementation tools used by Oregon. The HHWQC for mercury is presented as a fish tissue methyl mercury concentration. For the purposes of NPDES permitting, however, Oregon has developed an implementation management directive which states that any confirmed detection of mercury is considered to represent a "reasonable potential" to cause or contribute to a water quality standards violation of the methyl mercury criteria. The minimum quantification level for total mercury is presented as 0.005 micrograms per liter (µg/L) (5.0 nanograms per liter (ng/L)).
    - The assumed effluent limit for arsenic is taken from EPA's *National Recommended Water Quality Criteria* (2012) (inorganic, water and organisms, 10^{-6} excess cancer risk). Oregon's 2011 criterion is actually based on a less protective excess cancer risk (10^{-4}). This, however, is the result of a state-specific risk management choice and it is unclear if Washington's Department of Ecology would mimic the Oregon approach.
    - The assumption is that no mixing zone is granted such that HHWQC will effectively serve as NPDES permit effluent limits. Prior discussion on the impact of the Pinto Creek decision, 303(d) impairment and TMDL Waste Load Allocations processes, all lend support to this "no mixing zone" condition for the parameters evaluated in this study.
- Consistent with Ecology practice in the evaluation of proposed regulations, the HHWQC are assumed to be in effect for a 20-year period. It is assumed that analytical measurement technology and capability will continue to improve over this time frame and this will result in the detection and lower quantification of additional HHWQC in ambient water and NPDES dischargers. This knowledge will trigger the Pinto Creek/303(d)/TMDL issues identified above and tend to pressure NPDES permittees to evaluate and install advanced treatment technologies. The costs and efficacy of treatment for these additional HHWQC is unknown at this time.

Other elements of the Study Partners work scope, as presented to HDR, must be noted:

- The selection of four toxic pollutants and development of a baseline effluent scenario is not meant to imply that each NPDES permittee wastewater discharge will include those pollutants at the assumed concentrations. Rather, the scenario was intended to represent a composite of many NPDES permittees and to facilitate evaluation of advanced treatment technologies relying on mechanical, biological, physical, chemical processes.
- The scalability of advanced treatment technologies to wastewater treatment systems with different flow capacities, and the resulting unit costs for capital and O&M, is evaluated.
- Similarly, a sensitivity analysis on the unit costs for capital and O&M was evaluated on the assumption the adopted HHWQC (and effectively, NPDES effluent limits) are one order-of-magnitude less stringent than the Table 3 values.

Table 3: Summary of Effluent Discharge Toxics Limits

Constituent	Human Health Criteria based Limits to be met with no Mixing Zone (µg/L)	Basis for Criteria	Typical Concentration in Municipal Secondary Effluent (µg/L)	Typical Concentration in Industrial Secondary Effluent (µg/L)	Existing Washington HHC (water + org.), NTR (µg/L)
PCBs	0.0000064	Oregon Table 40 Criterion (water + organisms) at FCR of 175 grams/day	0.0005 to 0.0025[b,c,d,e,f]	0.002 to 0.005[i]	0.0017
Mercury	0.005	DEQ IMD[a]	0.003 to 0.050[h]	0.010 to 0.050[h]	0.140
Arsenic	0.018	EPA National Toxics Rule (water + organisms)[k]	0.500 to 5.0[j]	10 to 40[j]	0.018
Benzo(a)Pyrene	0.0013	Oregon Table 40 Criterion (water + organisms) at FCR of 175 grams/day	0.00028 to 0.006[b,g]	0.006 to1.9	0.0028

[a] Oregon Department of Environmental Quality (ODEQ). Internal Management Directive: Implementation of Methylmercury Criterion in NPDES Permits. January 8, 2013.
[b] Control of Toxic Chemicals in Puget Sound, Summary Technical Report for Phase 3: Loadings from POTW Discharge of Treated Wastewater, Washington Department of Ecology, Publication Number 10-10-057, December 2010.
[c] Spokane River PCB Source Assessment 2003-2007, Washington Department of Ecology, Publication No. 11-03-013, April 2011.
[d] Lower Okanogan River Basin DDT and PCBs Total Maximum Daily Load, Submittal Report, Washington Department of Ecology, Publication Number 04-10-043, October 2004.
[e] Palouse River Watershed PCB and Dieldrin Monitoring, 2007-2008, Wastewater Treatment Plants and Abandoned Landfills, Washington Department of Ecology, Publication No. 09-03-004, January 2009
[f] A Total Maximum Daily Load Evaluation for Chlorinated Pesticides and PCBs in the Walla Walla River, Washington Department of Ecology, Publication No. 04-03-032, October 2004.
[g] Removal of Polycyclic Aromatic Hydrocarbons and Heterocyclic Nitrogenous Compounds by A POTW Receiving Industrial Discharges, Melcer, H., Steel, P. and Bedford, W.K., Water Environment Federation, 66th Annual Conference and Exposition, October 1993.
[h] Data provided by Lincoln Loehr's summary of WDOE Puget Sound Loading data in emails from July 19, 2013.
[i] NCASI memo from Larry Lefleur, NCASI, to Llewellyn Matthews, NWPPA, revised June 17, 2011, summarizing available PCB monitoring data results from various sources.
[j] Professional judgment, discussed in August 6, 2013 team call.
[k] The applicable Washington Human Health Criteria cross-reference the EPA National Toxics Rule, 40 CFR 131.36. The EPA arsenic HHC is 0.018 ug/L for water and organisms.

3.0 Wastewater Characterization Description

This section describes the wastewater treatment discharge considered in this technology evaluation. Treated wastewater characteristics are described, including average and peak flow, effluent concentrations, and toxic compounds of concern.

3.1 Summary of Wastewater Characterization

A general wastewater treatment process and wastewater characteristics were developed as the common baseline to represent the existing conditions as a starting point for comparison with potential future advanced treatment technologies and improvements. A secondary treatment process with disinfection at a flow of 5 mgd as the current, baseline treatment system for existing dischargers was also developed. Typical effluent biochemical oxygen demand (BOD) and total suspended solids (TSS) were assumed between 10 to 30 mg/L from such a facility and no nutrient or toxics removal was assumed to be accomplished in the existing baseline treatment process.

3.2 Existing Wastewater Treatment Facility

The first step in the process is to characterize the existing wastewater treatment plant to be evaluated in this study. The goal is to identify the necessary technology that would need to be added to an existing treatment facility to comply with revised toxic pollutant effluent limits. Rather than evaluating the technologies and costs to upgrade multiple actual operating facilities, the Study Partners specified that a generalized municipal/industrial wastewater treatment facility would be characterized and used as the basis for developing toxic removal approaches. General characteristics of the facility's discharge are described in Table 4.

Table 4. General Wastewater Treatment Facility Characteristics

Average Annual Wastewater Flow, mgd	Maximum Month Wastewater Flow, mgd	Peak Hourly Wastewater Flow, mgd	Effluent BOD, mg/L	Effluent TSS, mg/L
5.0	6.25	15.0	10 to 30	10 to 30

mgd=million gallons per day
mg/L=milligrams per liter
BOD=biochemical oxygen demand
TSS=total suspended solids

In the development of the advanced treatment technologies presented below, the capacity of major treatment elements are generally sized to accommodate the maximum month average wastewater flow. Hydraulic elements, such as pumps and pipelines, were selected to accommodate the peak hourly wastewater flow.

The general treatment facility incorporates a baseline treatment processes including influent screening, grit removal, primary sedimentation, suspended growth biological treatment (activated sludge), secondary clarification, and disinfection using chlorine. Solids removed during primary treatment and secondary clarification are assumed to be thickened, stabilized, dewatered, and land applied to agricultural land. The biological treatment process is assumed to be activated sludge with a relatively short (less than 10-day) solids retention time. The baseline secondary treatment facility is assumed not to have processes dedicated to removing nutrients or toxics. However, some coincident removal of toxics will occur during conventional treatment.

3.3 Toxic Constituents

As described in Section 2.3, the expectation of more stringent HHWQC will eventually trigger regulatory demands for NPDES permittees to install advanced treatment technologies. The Study Group and HDR selected four specific toxic pollutants reflecting a range of toxic constituents as the basis for this study to limit the constituents and technologies to be evaluated to a manageable level.

The four toxic pollutants selected were PCBs, mercury, arsenic, and BAP, a polycyclic aromatic hydrocarbon (PAH). Mercury and arsenic are metals, and PCBs and PAHs are organic compounds. Technologies for removing metals and organic compounds are in some cases different. Key information on each of the compounds, including a description of the constituent, the significance of each constituent, proposed HHWQC, basis for the proposed criteria, typical concentration in both municipal and industrial secondary effluent, and current Washington state water quality criteria, are shown in Table 3. It is assumed that compliance with the proposed criteria in the table would need to be achieved at the "end of pipe" and Ecology would not permit a mixing zone for toxic constituents. This represents a "worst–case," but a plausible assumption about discharge conditions.

4.0 Treatment Approaches and Costs

4.1 Summary of Treatment Approach and Costs

Two advanced treatment process options for toxics removal for further evaluation based on the characterization of removal effectiveness from the technical literature review and Study Group preferences. The two tertiary treatment options are microfiltration MF followed by either RO or GAC as an addition to an existing secondary treatment facility. Based on the literature review, it is not anticipated that any of the treatment options will be effective in reducing all of the selected pollutants to below the anticipated water quality criteria. A summary of the capital and operations and maintenance costs for tertiary treatment is provided, as well as a comparison of the adverse environmental impacts for each alternative.

4.2 Constituent Removal – Literature Review

The evaluation of treatment technologies relevant to the constituents of concern was initiated with a literature review. The literature review included a desktop search using typical web-based search engines, and search engines dedicated to technical and research journal databases. At the same time, HDR's experience with the performance of existing treatment technologies specifically related to the four constituents of concern, was used in evaluating candidate technologies. A summary of the constituents of concern and relevant treatment technologies is provided in the following literature review section.

4.2.1 Polychlorinated Biphenyls

PCBs are persistent organic pollutants that can be difficult to remove in treatment. PCB treatment in wastewater can be achieved using oxidation with peroxide, filtration, biological treatment or a combination of these technologies. There is limited information available about achieving ultra-low effluent PCB concentrations near the 0.0000064 µg/L range under consideration in the proposed rulemaking process. This review provides a summary of treatment technology options and anticipated effluent PCB concentrations.

Research on the effectiveness of ultraviolet (UV) light and peroxide on removing PCBs was tested in bench scale batch reactions (Yu, Macawile, Abella, & Gallardo 2011). The combination of UV and peroxide treatment achieved PCB removal greater than 89 percent, and in several cases exceeding 98 percent removal. The influent PCB concentration for the batch tests ranged from 50 to 100 micrograms per liter (µg/L). The final PCB concentration (for the one congener tested) was <10 µg/L (10,000 ng/L) for all tests and <5 µg/L (5,000 ng/L) for some tests. The lowest PCB concentrations in the effluent occurred at higher UV and peroxide doses.

Pilot testing was performed to determine the effectiveness of conventional activated sludge and a membrane bioreactor to remove PCBs (Bolzonella, Fatone, Pavan, & Cecchi 2010). EPA Method 1668 was used for the PCB analysis (detection limit of 0.01 ng/L per congener). Influent to the pilot system was a combination of municipal and industrial effluent. The detailed analysis was for several individual congeners. Limited testing using the Aroclor method (total PCBs) was used to compare the individual congeners and the total concentration of PCBs. Both conventional activated sludge and membrane bioreactor (MBR) systems removed PCBs. The effluent MBR concentrations ranged from <0.01 ng/L to 0.04 ng/L compared to <0.01 ng/L to 0.88 ng/L for conventional activated sludge. The pilot testing showed that increased solids retention time (SRT) and higher mixed liquor suspended solids concentrations in the MBR system led to increased removal in the liquid stream.

Bench scale studies were completed to test the effectiveness of GAC and biological activated carbon (BAC) for removing PCBs (Ghosh, Weber, Jensen, & Smith 1999). The effluent from the

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GAC system was 800 ng/L. The biological film in the BAC system was presumed to support higher PCB removal with effluent concentrations of 200 ng/L. High suspended sediment in the GAC influent can affect performance. It is recommended that filtration be installed upstream of a GAC system to reduce solids and improve effectiveness.

Based on limited available data, it appears that existing municipal secondary treatment facilities in Washington state are able to reduce effluent PCBs to the range approximately 0.10 to 1.5 ng/L. It appears that the best performing existing municipal treatment facility in Washington state with a microfiltration membrane is able to reduce effluent PCBs to the range approximately 0.00019 to 0.00063 µg/L. This is based on a very limited data set and laboratory blanks covered a range that overlapped with the effluent results (blanks 0.000058 to 0.00061 µg/L).

Addition of advanced treatment processes would be expected to enhance PCB removal rates, but the technical literature does not appear to provide definitive information for guidance. A range of expected enhanced removal rates might be assumed to vary widely from level of the reference microfiltration facility of 0.19 to 0.63 ng/L.

Summary of PCB Technologies

The literature review revealed there are viable technologies available to reduce PCBs **but no research was identified with treatment technologies capable of meeting the anticipated human health criteria based limits for PCB removal**. Based on this review, a tertiary process was selected to biologically reduce PCBs and separate the solids using tertiary filtration. Alternately, GAC was investigated as an option to reduce PCBs, although it is not proven that it will meet revised effluent limits.

4.2.2 Mercury

Mercury removal from wastewater can be achieved using precipitation, adsorption, filtration, or a combination of these technologies. There is limited information available about achieving ultra-low effluent mercury concentrations near the 5 ng/L range under consideration in the proposed rulemaking process. This review provides a summary of treatment technology options and anticipated effluent mercury concentrations.

Precipitation (and co-precipitation) involves chemical addition to form a particulate and solids separation, using sedimentation or filtration. Precipitation includes the addition of a chemical precipitant and pH adjustment to optimize the precipitation reaction. Chemicals can include metal salts (ferric chloride, ferric sulfate, ferric hydroxide, or alum), pH adjustment, lime softening, or sulfide. A common precipitant for mercury removal is sulfide, with an optimal pH between 7 and 9. The dissolved mercury is precipitated with the sulfide to form an insoluble mercury sulfide that can be removed through clarification or filtration. One disadvantage of precipitation is the generation of a mercury-laden sludge that will require dewatering and disposal. The mercury sludge may be considered a hazardous waste and require additional treatment and disposal at a hazardous waste site. The presence of other compounds, such as other metals, may reduce the effectiveness of mercury precipitation/co-precipitation. For low-level mercury treatment requirements, several treatment steps will likely be required in pursuit of very low effluent targets.

EPA compiled a summary of facilities that are using precipitation/co-precipitation for mercury treatment (EPA 2007). Three of the full-scale facilities were pumping and treating groundwater and the remaining eight facilities were full-scale wastewater treatment plants. One of the pump and treat systems used precipitation, carbon adsorption, and pH adjustment to treat groundwater to effluent concentrations of 300 ng/L.

Adsorption treatment can be used to remove inorganic mercury from water. While adsorption can be used as a primary treatment step, it is frequently used for polishing after a preliminary treatment step (EPA 2007). One disadvantage of adsorption treatment is that when the adsorbent is saturated, it either needs to be regenerated or disposed of and replaced with new adsorbent. A common adsorbent is GAC. There are several patented and proprietary adsorbents on the market for mercury removal. Adsorption effectiveness can be affected by water quality characteristics, including high solids and bacterial growth, which can cause media blinding. A constant and low flow rate to the adsorption beds increases effectiveness (EPA 2007). The optimal pH for mercury adsorption on GAC is pH 4 to 5; therefore, pH adjustment may be required.

EPA compiled a summary of facilities that are using adsorption for mercury treatment (EPA 2007). Some of the facilities use precipitation and adsorption as described above. The six summarized facilities included two groundwater treatment and four wastewater treatment facilities. The reported effluent mercury concentrations were all less than 2,000 ng/L (EPA 2007).

Membrane filtration can be used in combination with a preceding treatment step. The upstream treatment is required to precipitate soluble mercury to a particulate form that can be removed through filtration. According to the EPA summary report, ultrafiltration is used to remove high-molecular weigh contaminants and solids (EPA 2007). The treatment effectiveness can depend on the source water quality since many constituents can cause membrane fouling, decreasing the effectiveness of the filters. One case study summarized in the EPA report showed that treatment of waste from a hazardous waste combustor treated with precipitation, sedimentation, and filtration achieved effluent mercury concentrations less than the detection limit of 200 ng/L.

Bench-scale research performed at the Oak Ridge Y-12 Plant in Tennessee evaluated the effectiveness of various adsorbents for removing mercury to below the NPDES limit of 12 ng/L and the potential revised limit of 51 ng/L (Hollerman et al. 1999). Several proprietary adsorbents were tested, including carbon, polyacrylate, polystyrene, and polymer adsorption materials. The adsorbents with thiol-based active sites were the most effective. Some of the adsorbents were able to achieve effluent concentrations less than 51 ng/L but none of the adsorbents achieved effluent concentrations less than 12 ng/L.

Bench-scale and pilot-scale testing performed on refinery wastewater was completed to determine treatment technology effectiveness for meeting very low mercury levels (Urgun-Demirtas, Benda, Gillenwater, Negri, Xiong & Snyder 2012) (Urgun-Demirtas, Negri, Gillenwater, Agwu Nnanna & Yu 2013). The Great Lakes Initiative water quality criterion for mercury is less than 1.3 ng/L for municipal and industrial wastewater plants in the Great Lakes region. This research included an initial bench scale test including membrane filtration, ultrafiltration, nanofiltration, and reverse osmosis to meet the mercury water quality criterion. The nanofiltration and reverse osmosis required increased pressures for filtration and resulted in increased mercury concentrations in the permeate. Based on this information and the cost difference between the filtration technologies, a pilot-scale test was performed. The 0.04 um PVDF GE ZeeWeed 500 series membranes were tested. The 1.3 ng/L water quality criterion was met under all pilot study operating conditions. The mercury in the refinery effluent was predominantly in particulate form which was well-suited for removal using membrane filtration.

Based on available data, it appears that existing municipal treatment facilities are capable of reducing effluent mercury to near the range of the proposed HHWQC on an average basis. Average effluent mercury in the range of 1.2 to 6.6 ng/L for existing facilities with secondary treatment and enhanced treatment with cloth filters and membranes. The Spokane County plant data range is an average of 1.2 ng/L to a maximum day of 3 ng/L. Addition of

advanced treatment processes such as GAC or RO would be expected to enhance removal rates. Data from the West Basin treatment facility in California suggests that at a detection limit of 7.99 ng/L mercury is not detected in the effluent from this advanced process train. A range of expected enhanced removal rates from the advanced treatment process trains might be expected to ranged from meeting the proposed standard at 5 ng/L to lower concentrations represented by the Spokane County performance level (membrane filtration) in the range of 1 to 3 ng/L, to perhaps even lower levels with additional treatment. For municipal plants in Washington, this would suggest that effluent mercury values from the two advanced treatment process alternatives might range from 1 to 5 ng/L (0.001 to 0.005 µg/L) and perhaps substantially better, depending upon RO and GAC removals. It is important to note that industrial plants may have higher existing mercury levels and thus the effluent quality that is achievable at an industrial facility would be of lower quality.

Summary of Mercury Technologies

The literature search revealed limited research on mercury removal technologies at the revised effluent limit of 0.005 µg/L. Tertiary filtration with membrane filters or reverse osmosis showed the best ability to achieve effluent criteria less than 0.005 µg/L.

4.2.3 Arsenic

A variety of treatment technologies can be applied to capture arsenic (Table 5). Most of the information in the technical literature and from the treatment technology vendors is focused on potable water treatment for compliance with a Safe Drinking Water Act (SDWA) maximum contaminant level (MCL) of 10 µg/L. The most commonly used arsenic removal method for a wastewater application (tertiary treatment) is coagulation/ flocculation plus filtration. This method by itself could remove more than 90 to 95 percent of arsenic. Additional post-treatment through adsorption, ion exchange, or reverse osmosis is required for ultra-low arsenic limits in the 0.018 µg/L range under consideration in the proposed rulemaking process. In each case it is recommended to perform pilot-testing of each selected technology.

Table 5: Summary of Arsenic Removal Technologies[1]

Technology	Advantages	Disadvantages
Coagulation/filtration	• Simple, proven technology • Widely accepted • Moderate operator training	• pH sensitive • Potential disposal issues of backwash waste • As^{+3} and As^{+5} must be fully oxidized
Lime softening	• High level arsenic treatment • Simple operation change for existing lime softening facilities	• pH sensitive (requires post treatment adjustment) • Requires filtration • Significant sludge operation
Adsorptive media	• High As^{+5} selectivity • Effectively treats water with high total dissolved solids (TDS)	• Highly pH sensitive • Hazardous chemical use in media regeneration • High concentration SeO_4^{-2}, F^-, Cl^-, and SO_4^{-2} may limit arsenic removal

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Table 5: Summary of Arsenic Removal Technologies[1]

Technology	Advantages	Disadvantages
Ion exchange	• Low contact times • Removal of multiple anions, including arsenic, chromium, and uranium	• Requires removal of iron, manganese, sulfides, etc. to prevent fouling • Brine waste disposal
Membrane filtration	• High arsenic removal efficiency • Removal of multiple contaminants	• Reject water disposal • Poor production efficiency • Requires pretreatment

[1]Adapted from WesTech

The removal of arsenic in activated sludge is minimal (less than 20 percent) (Andrianisa et al. 2006), but biological treatment can control arsenic speciation. During aerobic biological process As (III) is oxidized to As (V). Coagulation/flocculation/filtration removal, as well as adsorption removal methods, are more effective in removal of As(V) vs. As (III). A combination of activated sludge and post-activated sludge precipitation with ferric chloride (addition to MLSS and effluent) results in a removal efficiency of greater than 95 percent. This combination could decrease As levels from 200 µg/L to less than 5 µg/L (5,000 ng/L) (Andrianisa et al. 2008) compared to the 0.018 µg/L range under consideration in the proposed rulemaking process.

Data from the West Basin facility (using MF/RO/AOP) suggests effluent performance in the range of 0.1 to 0.2 µg/L, but it could also be lower since a detection limit used there of 0.15 µg/l is an order of magnitude higher than the proposed HHWQC. A range of expected enhanced removal rates might be assumed to equivalent to that achieved at West Basin in 0.1 to 0.2 µg/L range.

Review of Specific Technologies for Arsenic Removal

Coagulation plus Settling or Filtration

Coagulation may remove more than 95 percent of arsenic through the creation of particulate metal hydroxides. Ferric sulfite is typically more efficient and applicable to most wastewater sources compared to alum. The applicability and extent of removal should be pilot-tested, since removal efficiency is highly dependent on the water constituents and water characteristics (i.e., pH, temperature, solids).

Filtration can be added after or instead of settling to increase arsenic removal. Example treatment trains with filtration are shown in Figures 1 and 2, respectively.

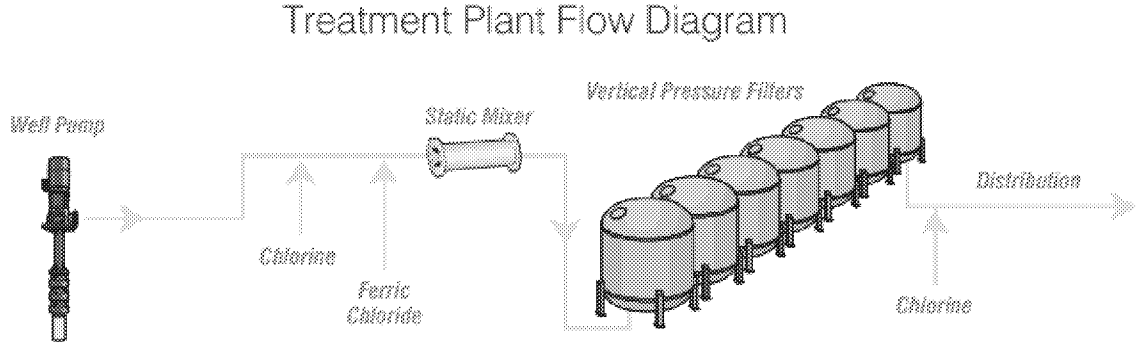

Figure 1. Water Treatment Configuration for Arsenic Removal (WesTech)

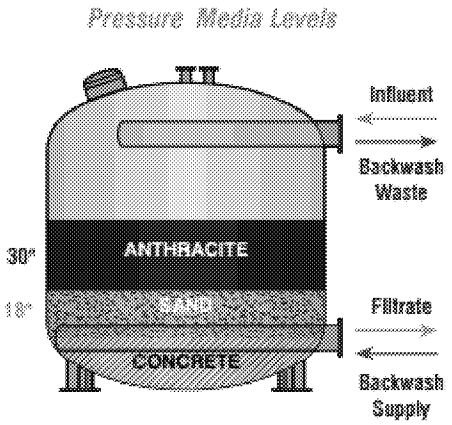

Figure 2. WesTech Pressure Filters for Arsenic Removal

One system for treatment of potable water with high levels of arsenic in Colorado (110 parts per million [ppm]) consists of enhanced coagulation followed by granular media pressure filters that include anthracite/silica sand/garnet media (WesTech). The arsenic levels were reduced to less than the drinking water MCL, which is 10 µg/L (10,000 ng/L). The plant achieves treatment by reducing the pH of the raw water to 6.8 using sulfuric acid, and then adding approximately 12 to 14 mg/L ferric sulfate. The water is filtered through 16 deep bed vertical pressure filters, the pH is elevated with hydrated lime and is subsequently chlorinated and fed into the distribution system (http://www.westech-inc.com/public/uploads/global/2011/3/Fallon%20NV%20Installation%20ReportPressureFilter.pdf).

Softening (with lime)

Removes up to 90 percent arsenic through co-precipitation, but requires pH to be higher than 10.2.

Adsorption processes

Activated alumina is considered an adsorptive media, although the chemical reaction is an exchange of arsenic ions with the surface hydroxides on the alumina. When all the surface hydroxides on the alumina have been exchanged, the media must be regenerated. Regeneration consists of backwashing, followed by sodium hydroxide, flushing with water and neutralization with a strong acid. Effective arsenic removal requires sufficient empty bed contact time. Removal efficiency can also be impacted by the water pH, with neutral or slightly acidic conditions being considered optimum. If As (III) is present, it is generally advisable to increase empty bed contact time, as As (III) is adsorbed more slowly than As (V). Alumina dissolves slowly over time due to contact with the chemicals used for regeneration. As a result, the media bed is likely to become compacted if it is not backwashed periodically.

Granular ferric hydroxide works by adsorption, but when the media is spent it cannot be regenerated and must be replaced. The life of the media depends upon pH of the raw water, the concentrations of arsenic and heavy metals, and the volume of water treated daily. Periodic backwashing is required to prevent the media bed from becoming compacted and pH may need to be adjusted if it is high, in order to extend media life. For maximum arsenic removal, filters operate in series. For less stringent removal, filters can operate in parallel.

One type of adsorption media has been developed for application to non-drinking water processes for arsenic, phosphate and for heavy metals removal by sorption (Severent Trent Bayoxide® E IN-20). This granular ferric oxide media has been used for arsenic removal from

mining and industrial wastewaters, selenium removal from refinery wastes and for phosphate polishing of municipal wastewaters. Valley Vista drinking water treatment with Bayoxide® E IN-20 media achieves removal from 31-39 µg/L (31,000-39,000 ng/L) to below 10 µg/L MCL. (http://www.severntrentservices.com/News/Successful_Drinking_Water_Treatment_in_an_Arsenic_Hot_Spot_nwMFT_452.aspx).

Another adsorptive filter media is greensand. Greensand is available in two forms: as glauconite with manganese dioxide bound ionically to the granules and as silica sand with manganese dioxide fused to the granules. Both forms operate in pressure filters and both are effective. Greensand with the silica sand core operates at higher water temperatures and higher differential pressures than does greensand with the glauconite core. Arsenic removal requires a minimum concentration of iron. If a sufficient concentration of iron is not present in the raw water, ferric chloride is added.

WesTech filters with greensand and permanganate addition for drinking water systems can reduce As from 15-25 µg/L to non-detect. Sodium hypochlorite and/or potassium permanganate are added to the raw water prior to the filters. Chemical addition may be done continuously or intermittently, depending on raw water characteristics. These chemicals oxidize the iron in the raw water and also maintain the active properties of the greensand itself. Arsenic removal is via co-precipitation with the iron.

Ion Exchange

Siemens offers a potable ion exchange (PIX) arsenic water filtration system. PIX uses ion exchange resin canisters for the removal of organic and inorganic contaminants, in surface and groundwater sources to meet drinking water standards.

Filtronics also uses ion exchange to treat arsenic. The technology allows removal for below the SWDA MCL for potable water of 10 µg/L (10,000 ng/L).

Reverse osmosis

Arsenic is effectively removed by RO when it is in oxidative state As(V) to approximately 1,000 ng/L or less (Ning 2002).

Summary of Arsenic Technologies

The current state of the technology for arsenic removal is at the point where all the processes target the SWDA MCL for arsenic in potable water. Current EPA maximum concentration level for drinking water is 10 ug/l; much higher than 0.0018 µg/L target for arsenic in this study. The majority of the methods discussed above are able to remove arsenic to either EPA maximum contaminant level or to the level of detection. The lowest detection limit of one of the EPA approved methods of arsenic measurements is 20 ng/l (0.020 µg/l) (Grosser, 2010), which is comparable to the 0.018 µg/L limit targeted in this study.

4.2.1 Polycyclic Aromatic Hydrocarbons

BAP During Biological Treatment

During wastewater treatment process, BAP tends to partition into sludge organic matter (Melcer et al. 1993). Primary and secondary processing could remove up to 60 percent of incoming PAHs and BAP in particular, mostly due to adsorption to sludge (Kindaichi et al., NA, Wayne et al. 2009). Biodegradation of BAP is expected to be very low since there are more than five benzene rings which are resistant to biological degradation. Biosurfactant addition to biological process could partially improve biodegradation, but only up to removal rates of 50 percent (Sponza et al. 2010). Existing data from municipal treatment facilities in Washington state have

influent and effluent concentrations of BAP of approximately 0.30 ng/L indicating that current secondary treatment has limited effectiveness at BAP removal.

Methods to Enhance Biological Treatment of BAP

Ozonation prior to biological treatment could potentially improve biodegradability of BAP (Zeng et al. 2000). In the case of soil remediation, ozonation before biotreatment improved biodegradation by 70 percent (Russo et al. 2012). The overall removal of BAP increased from 23 to 91 percent after exposure of water to 0.5 mg/L ozone for 30 minutes during the simultaneous treatment process and further to 100 percent following exposure to 2.5 mg/L ozone for 60 minutes during the sequential treatment mode (Yerushalmi et al. 2006). In general, to improve biodegradability of BAP, long exposure to ozone might be required (Haapea et al. 2006).

Sonication pre-treatment or electronic beam irradiation before biological treatment might also make PAHs more bioavailable for biological degradation..

Recent studies reported that a MBR is capable of removing PAHs from wastewater (Rodrigue and Reilly 2009; Gonzaleza et al. 2012). None of the studies listed the specific PAHs constituents removed.

Removal of BAP from Drinking Water

Activated Carbon

Since BAP has an affinity to particulate matter, it is removed from the drinking water sources by means of adsorption, such as granular activated carbon (EPA). Similarly, Oleszczuk et al. (2012) showed that addition of 5 percent activated carbon could remove 90 percent of PAHs from the wastewater.

Reverse Osmosis

Light (1981) (referenced by Williams, 2003) studied dilute solutions of PAHs, aromatic amines, and nitrosamines and found rejections of these compounds in reverse osmosis to be over 99 percent for polyamide membranes. Bhattacharyya et al. (1987) (referenced by Williams, 2003) investigated rejection and flux characteristics of FT30 membranes for separating various pollutants (PAHs, chlorophenols, nitrophenols) and found membrane rejections were high (>98 percent) for the organics under ionized conditions.

Summary of BAP Technologies

Current technologies show that BAP removal may be 90 percent or greater. The lowest detection limit for BAP measurements is 0.006 µg/L, which is also the assumed secondary effluent BAP concentration assumed for this study. If this assumption is accurate, it appears technologies may exist to remove BAP to a level below the proposed criteria applied as an effluent limit of 0.0013 µg/L; however, detection limits exceed this value and it is impossible to know this for certain.

4.3 Unit Processes Evaluated

Based on the results of the literature review, a wide range of technologies were evaluated for toxic constituent removal. A listing of the technologies is as follows:

- Chemically enhanced primary treatment (CEPT): this physical and chemical technology is based on the addition of a metal salt to precipitate particles prior to primary treatment, followed by sedimentation of particles in the primary clarifiers. This technology has been

shown to effectively remove arsenic but there is little data supporting the claims. As a result, the chemical facilities are listed as optional.

- Activated sludge treatment (with a short SRT of approximately 8 days or less): this biological technology is commonly referred to as secondary treatment. It relies on converting dissolved organics into solids using biomass. Having a short SRT is effective at removing degradable organics referred to as BOD compounds for meeting existing discharge limits. Dissolved constituents with a high affinity to adsorb to biomass (e.g., metals, high molecular weight organics, and others) will be better removed compared to smaller molecular weight organics and recalcitrant compounds which will have minimal removal at a short SRT.
- Enhanced activated sludge treatment (with a long SRT of approximately 8 days or more): this technology builds on secondary treatment by providing a longer SRT, which enhances sorption and biodegradation. The improved performance is based on having more biomass coupled with a more diverse biomass community, especially nitrifiers, which have been shown to assist in removal of some of the more recalcitrant constituents not removed with a shorter SRT (e.g., lower molecular weight PAHs). There is little or no data available on the effectiveness of this treatment for removing BAP.

  Additional benefits associated with having a longer SRT are as follows:

  - Lower BOD/TSS discharge load to receiving water
  - Improved water quality and benefit to downstream users
  - Lower effluent nutrient concentrations which reduce algal growth potential in receiving waters
  - Reduced receiving water dissolved oxygen demand due to ammonia removal
  - Reduced ammonia discharge, which is toxic to aquatic species
  - Improved water quality for habitat, especially as it relates to biodiversity and eutrophication
  - Secondary clarifier effluent more conditioned for filtration and disinfection
  - Greater process stability from the anaerobic/anoxic zones serving as biological selectors
- Coagulation/Flocculation and Filtration: this two-stage chemical and physical process relies on the addition of a metal salt to precipitate particles in the first stage, followed by the physical removal of particles in filtration. This technology lends itself to constituents prone to precipitation (e.g., arsenic).
- Lime Softening: this chemical process relies on increasing the pH as a means to either volatilize dissolved constituents or inactivate pathogens. Given that none of the constituents being studied are expected to volatilize, this technology was not carried forward.
- Adsorptive Media: this physical and chemical process adsorbs constituents to a combination of media and/or biomass/chemicals on the media. There are several types of media, with the most proven and common being GAC. GAC can also serve as a coarse roughing filter.
- Ion Exchange: this chemical technology exchanges targeted constituents with a resin. This technology is common with water softeners where the hard divalent cations are

exchanged for monovalent cations to soften the water. Recently, resins that target arsenic and mercury removal include activated alumina and granular ferric hydroxides have been developed. The resin needs to be cleaned and regenerated, which produces a waste slurry that requires subsequent treatment and disposal. As a result, ion exchange was not considered for further.

- Membrane Filtration: This physical treatment relies on the removal of particles larger than the membranes pore size. There are several different membrane pore sizes as categorized below.
    - Microfiltration (MF): nominal pore size range of typically between 0.1 to 1 micron. This pore size targets particles, both inert and biological, and bacteria. If placed in series with coagulation/flocculation upstream, dissolved constituents precipitated out of solution and bacteria can be removed by the MF membrane.
    - Ultrafiltration (UF): nominal pore size range of typically between 0.01 to 0.1 micron. This pore size targets those solids removed with MF (particles and bacteria) plus viruses and some colloidal material. If placed in series with coagulation/flocculation upstream, dissolved constituents precipitated out of solution can be removed by the UF membrane.
    - Nanofiltration (NF): nominal pore size range of typically between 0.001 to 0.010 micron. This pore size targets those removed with UF (particles, bacteria, viruses) plus colloidal material. If placed in series with coagulation/flocculation upstream, dissolved constituents precipitated out of solution can be removed by the NF membrane.
- MBR (with a long SRT): this technology builds on secondary treatment whereby the membrane (microfiltration) replaces the secondary clarifier for solids separation. As a result, the footprint is smaller, the mixed liquor suspended solids concentration can be increased to about 5,000 – 10,000 mg/L, and the physical space required for the facility reduced when compared to conventional activated sludge. As with the activated sludge option operated at a longer SRT, the sorption and biodegradation of organic compounds are enhanced in the MBR process. The improved performance is based on having more biomass coupled with a more diverse biomass community, especially nitrifiers which have been shown to assist in removal of persistent dissolved compounds (e.g., some PAHs). There is little or no data available on effectiveness at removing BAP. Although a proven technology, MBRs were not carried further in this technology review since they are less likely to be selected as a retrofit for an existing activated sludge (with a short SRT) secondary treatment facility. The MBR was considered to represent a treatment process approach more likely to be selected for a new, greenfield treatment facility. Retrofits to existing secondary treatment facilities can accomplish similar process enhancement by extending the SRT in the activated sludge process followed by the addition of tertiary membrane filtration units.
- RO: This physical treatment method relies on the use of sufficient pressure to osmotically displace water across the membrane surface while simultaneously rejecting most salts. RO is very effective at removing material smaller than the size ranges for the membrane filtration list above, as well as salts and other organic compounds. As a result, it is expected to be more effective than filtration and MBR methods described above at removing dissolved constituents. Although effective, RO produces a brine reject water that must be managed and disposed.

- Advanced Oxidation Processes (AOPs): this broad term considers all chemical and physical technologies that create strong hydroxyl-radicals. Examples of AOPs include Fenton's oxidation, ozonation, ultraviolet/hydrogen peroxide (UV-H2O2), and others. The radicals produced are rapid and highly reactive at breaking down recalcitrant compounds. Although effective at removing many complex compounds such as those evaluated in this study, AOPs does not typically have as many installations as membranes and activated carbon technologies. As a result, AOPs were not carried forward.

Based on the technical literature review discussed above, a summary of estimated contaminant removal rated by unit treatment process is presented in Table 6.

Table 6. Contaminants Removal Breakdown by Unit Process

Unit Process	Arsenic	BAP	Mercury	Polychlorinated Biphenyls
Activated Sludge Short SRT	No removal	Partial Removal by partitioning		80% removal; effluent <0.88 ng/L
Activated Sludge Long SRT	No removal	Partial removal by partitioning and/or partially biodegradation; MBR could potentially remove most of BAP		>90% removal with a membrane bioreactor, <0.04 ng/L (includes membrane filtration)
Membrane Filtration (MF)	More than 90 % removal (rejection of bound arsenic)	No removal	<1.3 ng/L	>90% removal with a membrane bioreactor, <0.04 ng/L (includes membrane filtration)
Reverse Osmosis (RO)	More than 90% removal (rejection of bound arsenic and removal of soluble arsenic)	More than 98% removal		
Granular Activated Carbon (GAC)	No removal, removal only when carbon is impregnated with iron	90 % removal	<300 ng/L (precipitation and carbon adsorption) <51 ng/L (GAC)	<800 ng/L Likely requires upstream filtration
Disinfection	--	--	--	--

4.4 Unit Processes Selected

The key conclusion from the literature review was that there is limited, to no evidence, that existing treatment technologies are capable of simultaneously meeting all four of the revised discharge limits for the toxics under consideration. Advanced treatment using RO or GAC is expected to provide the best overall removal of the constituents of concern. It is unclear whether these advanced technologies are able to meet revised effluent limits, however these processes may achieve the best effluent quality of the technologies reviewed. This limitation in the findings is based on a lack of an extensive dataset on treatment removal effectiveness in the technical literature for the constituents of interest at the low levels relevant to the proposed criteria, which

approach the limits of reliable removal performance for the technologies. As Table 6 highlights, certain unit processes are capable of removing a portion, or all, of the removal requirements for each technology. The removal performance for each constituent will vary from facility to facility and require a site-specific, detailed evaluation because the proposed criteria are such low concentrations. In some cases, a facility may only have elevated concentrations of a single constituent of concern identified in this study. In other cases, a discharger may have elevated concentrations of the four constituents identified in this study, as well as others not identified in this study but subject to revised water quality criteria. This effort is intended to describe a planning level concept of what treatment processes are required to comply with discharge limits for all four constituents. Based on the literature review of unit processes above, two different treatment trains were developed for the analysis that are compared against a baseline of secondary treatment as follows:

- Baseline: represents conventional secondary treatment that is most commonly employed nationwide at wastewater treatment plants. A distinguishing feature for this treatment is the short solids residence time (SRT) (<8 days) is intended for removal of BOD with minimal removal for the toxic constituents of concern.
- Advanced Treatment – MF/RO: builds on baseline with the implementation of a longer SRT (>8 days) and the addition of MF and RO. The longer SRT not only removes BOD, but it also has the capacity to remove nutrients and a portion of the constituents of concern. This alternative requires a RO brine management strategy which will be discussed in sub-sections below.
- Advanced Treatment – MF/GAC: this alternative provides a different approach to advanced treatment with MF/RO by using GAC and avoiding the RO reject brine water management concern. Similar to the MF/RO process, this alternative has the longer SRT (>8 days) with the capacity to remove BOD, nutrients, and a portion of the toxic constituents of concern. As a result, the decision was made to develop costs for both advanced treatment options.

A description of each alternative is provided in Table 7. The process flowsheets for each alternative are presented in Figure 3 to Figure 5.

Table 7. Unit Processes Description for Each Alternative

Unit Process	Baseline	Advanced Treatment – MF/RO	Advanced Treatment - GAC
Influent Flow	5 mgd	5 mgd	5 mgd
Chemically Enhanced Primary Treatment (CEPT); Optional	--	• Metal salt addition (alum) upstream of primaries	• Metal salt addition (alum) upstream of primaries
Activated Sludge	• Hydraulic Residence Time (HRT): 6 hrs • Short Solids Residence Time (SRT): <8 days	• Hydraulic Residence Time (HRT): 12 hrs (Requires more tankage than the Baseline) • Long Solids Residence Time (SRT): >8 days (Requires more tankage than the Baseline)	• Hydraulic Residence Time (HRT): 12 hrs (Requires more tankage than the Baseline) • Long Solids Residence Time (SRT): >8 days (Requires more tankage than the Baseline)
Secondary Clarifiers	Hydraulically Limited	Solids Loading Limited (Larger clarifiers than Baseline)	Solids Loading Limited (Larger clarifiers than Baseline)
Microfiltration (MF)	--	Membrane Filtration to Remove Particles and Bacteria	Membrane Filtration to Remove Particles and Bacteria
Reverse Osmosis (RO)	--	Treat 50% of the Flow by RO to Remove Metals and Dissolved Constituents. Sending a portion of flow through the RO and blending it with the balance of plant flows ensures a stable non-corrosive, non-toxic discharge.	--
Reverse Osmosis Brine Reject Mgmt	--	Several Options (All Energy or Land Intensive)	--
Granular Activated Carbon	--	--	Removes Dissolved Constituents
Disinfection	Not shown to remove any of the constituents	Not shown to remove any of the constituents	Not shown to remove any of the constituents

4.4.1 Baseline Treatment Process

A flowsheet of the baseline treatment process is provided in Figure 3. The baseline treatment process assumes the current method of treatment commonly employed by dischargers. For this process, water enters the headworks and undergoes primary treatment, followed by conventional activated sludge (short SRT) and disinfection. The solids wasted in the activated

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sludge process are thickened, followed by mixing with primary solids prior to entering the anaerobic digestion process for solids stabilization. The digested biosolids are dewatered to produce a cake and hauled off-site. Since the exact process for each interested facility in Washington is unique, this baseline treatment process was used to establish the baseline capital and O&M costs. The baseline costs will be compared against the advanced treatment alternatives to illustrate the magnitude of the increased costs and environmental impacts.

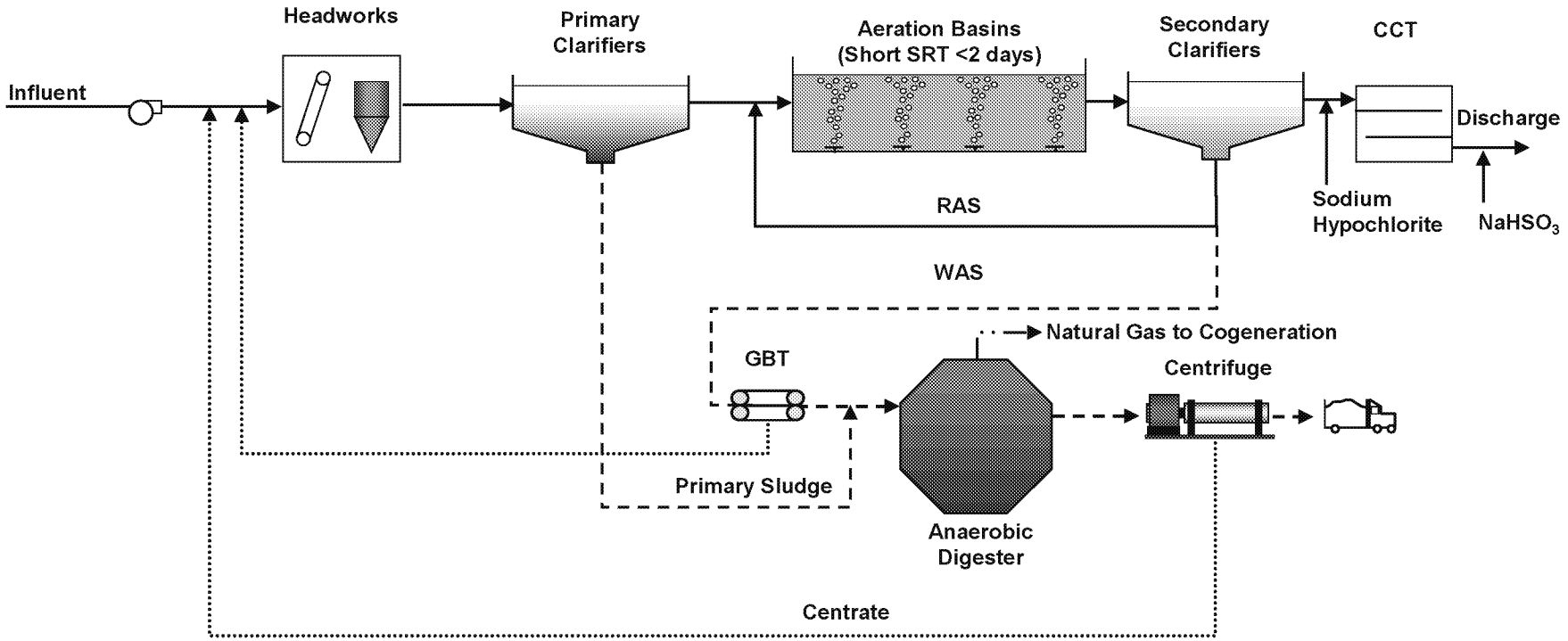

Figure 3. Baseline Flowsheet – Conventional Secondary Treatment

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4.4.2 Advanced Treatment – MF/RO Alternative

A flowsheet of the advanced treatment – MF/RO alternative is provided in Figure 4. This alternative builds on the baseline secondary treatment facility, whereby the SRT is increased in the activated sludge process, and MF and RO are added prior to disinfection. The solids treatment train does not change with respect to the baseline. Additionally, a brine management strategy must be considered.

The RO process concentrates contaminants into a smaller volume reject stream. Disposing of the RO reject stream can be a problem because of the potentially large volume of water involved and the concentration of contaminants contained in the brine. For reference, a 5 mgd process wastewater flow might result in 1 mgd of brine reject requiring further management. The primary treatment/handling options for RO reject are as follows:

- Zero liquid discharge
- Surface water discharge
- Ocean discharge
- Haul and discharge to coastal location for ocean discharge
- Sewer discharge
- Deep well injection
- Evaporate in a pond
- Solar pond concentrator

Many of the RO brine reject management options above result in returning the dissolved solids to a "water of the state" such as surface water, groundwater, or marine waters. Past rulings in Washington State have indicated that once pollutants are removed from during treatment they are not to be re-introduced to a water of the state. As a result, technologies with this means for disposal were not considered viable options for management of RO reject water in Washington.

Zero Liquid Discharge

Zero liquid discharge (ZLD) is a treatment process that produces a little or no liquid brine discharge but rather a dried residual salt material. This process improves the water recovery of the RO system by reducing the volume of brine that must be treated and disposed of in some manner. ZLD options include intermediate treatment, thermal-based technologies, pressure driven membrane technologies, electric potential driven membrane technologies, and other alternative technologies.

Summary

There are many techniques which can be used to manage reject brine water associated with RO treatment. The appropriate alternative is primarily governed by geographic and local constraints. A comparison of the various brine management methods and potential costs are provided in Table 8.

Table 8. Brine Disposal Method Relative Cost Comparison

Disposal Method	Description	Relative Capital Cost	Relative O&M Cost	Comments
Zero Liquid Discharge (ZLD)	Further concentrates brine reject for further downstream processing	High	High	This option is preferred as an intermediate step. This rationale is based on the reduction in volume to handle following ZLD. For example, RO reject stream volume is reduced on the order of 50-90%.
Surface Water Discharge	Brine discharge directly to surface water. Requires an NPDES permit.	Lowest	Lowest	Both capital and O&M costs heavily dependent on the distance from brine generation point to discharge. Not an option for nutrient removal.
Ocean Discharge	Discharge through a deep ocean outfall.	Medium	Low	Capital cost depends on location and availability of existing deep water outfall.
Sewer Discharge	Discharge to an existing sewer pipeline for treatment at a wastewater treatment plant.	Low	Low	Both capital and O&M costs heavily dependent on the brine generation point to discharge distance. Higher cost than surface water discharge due to ongoing sewer connection charge. Not an option for wastewater treatment.
Deep Well Injection	Brine is pumped underground to an area that is isolated from drinking water aquifers.	Medium	Medium	Technically sophisticated discharge and monitoring wells required. O&M cost highly variable based on injection pumping energy.
Evaporation Ponds	Large, lined ponds are filled with brine. The water evaporates and a concentrated salt remains.	Low – High	Low	Capital cost highly dependent on the amount and cost of land.
Salinity Gradient Solar Ponds (SGSP)	SGSPs harness solar power from pond to power an evaporative unit.	Low – High	Lowest	Same as evaporation ponds plus added cost of heat exchanger and pumps. Lower O&M cost due to electricity production.
Advanced Thermal Evaporation	Requires a two-step process consisting of a brine concentrator followed by crystallizer	High	Highest	Extremely small footprint, but the energy from H_2O removal is by far the most energy intensive unless waste heat is used.

Of the listed options, ZLD was considered for this analysis as the most viable approach to RO reject water management. An evaporation pond was used following ZLD. The strength in this combination is ZLD reduces the brine reject volume to treat, which in turn reduces the required evaporation pond footprint. It is important to recognize that the greenhouse gas (GHG) emissions vary widely for the eight brine management options listed above based on energy and chemical intensity.

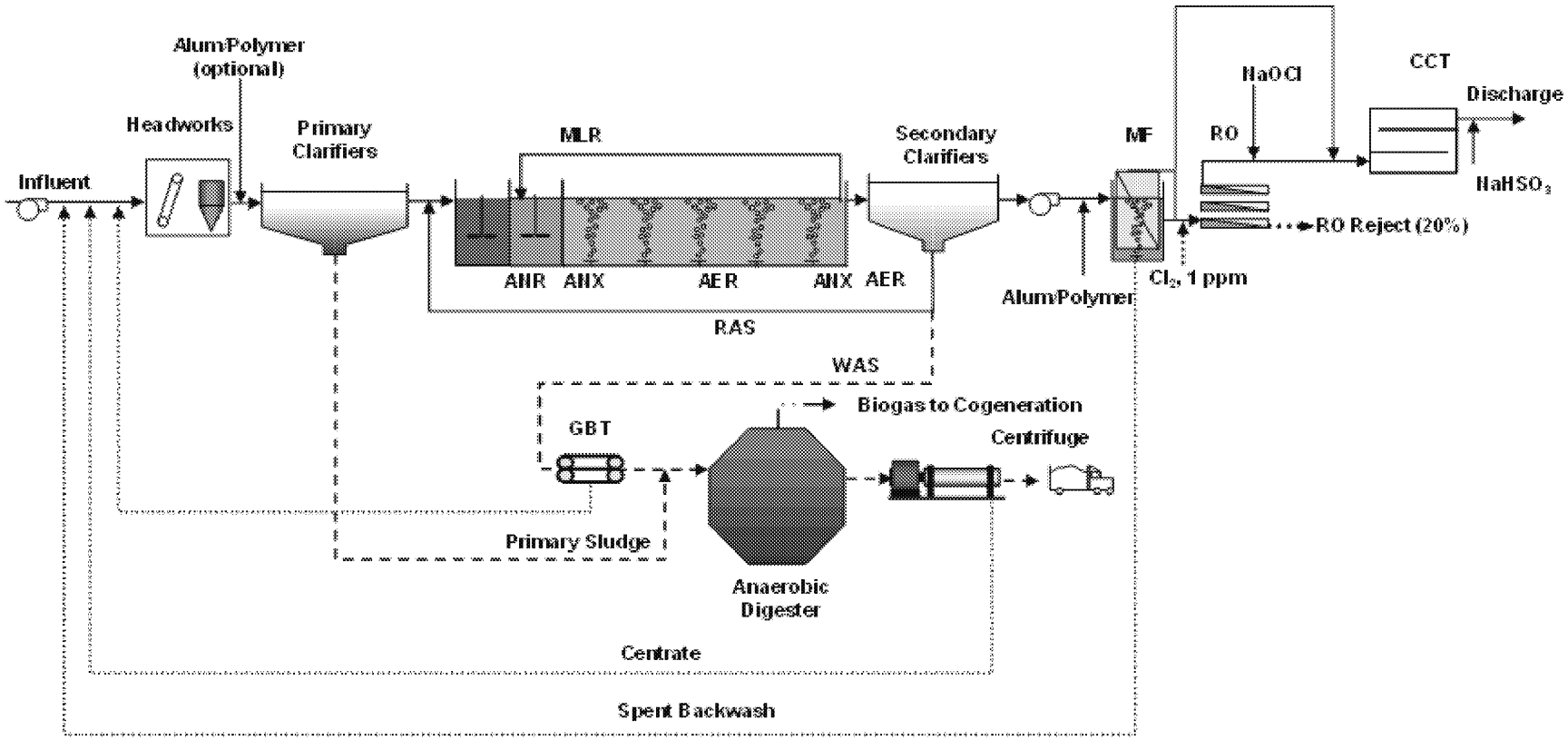

Figure 4. Advanced Treatment Flowsheet – Tertiary Microfiltration and Reverse Osmosis

4.4.3 Advanced Treatment – MF/GAC Alternative

A flowsheet of the advanced treatment – MF/GAC alternative is provided in Figure 5. Following the MF technology, a GAC contactor and media are required.

This alternative was developed as an option that does not require a brine management technology (e.g., ZLD) for comparison to the MF/RO advanced treatment alternative. However, this treatment alternative does require that the GAC be regenerated. A baseline secondary treatment facility can be retrofitted for MF/GAC. If an existing treatment facility has an extended aeration lagoon, the secondary effluent can be fed to the MF/GAC. The longer SRT in the extended aeration lagoon provides all the benefits associated with the long SRT in an activated sludge plant as previously stated:

- Lower BOD/TSS discharge load
- Higher removal of recalcitrant constituents and heavy metals
- Improved water quality and benefit to downstream users
- Less downstream algal growth
- Reduced receiving water dissolved oxygen demand due to ammonia removal
- Reduced ammonia discharge loads, which is toxic to several aquatic species
- Improved water quality for habitat, especially as it relates to biodiversity and eutrophication
- Secondary clarifier effluent more conditioned for filtration and disinfection
- Greater process stability from the anaerobic/anoxic zones serving as a selector

If an existing treatment facility employs a high rate activated sludge process (short SRT) similar to the baseline, it is recommended that the activated sludge process SRT be increased prior to the MF/GAC unit processes. The longer SRT upstream of the MF is preferred to enhance the membrane flux rate, reduce membrane biofouling, increase membrane life, and reduce the chemicals needed for membrane cleaning.

The key technical and operational challenges associated with the tertiary add-on membrane filtration units are as follows:

- The membrane filtration technology is a proven and reliable technology. With over 30 years of experience, it has made the transition in recent years from an emerging technology to a proven and reliable technology.
- Membrane durability dependent on feed water quality. The water quality is individual facility specific.
- Membranes are sensitive to particles, so upstream screening is critical. The newer generations of membranes have technical specifications that require a particular screen size.
- Membrane area requirements based on peak flows as water must pass through the membrane pores. Additionally, membranes struggle with variable hydraulic loading. Flow equalization upstream can greatly reduce the required membrane surface area and provide uniform membrane loading.
- Membrane tanks can exacerbate any foam related issues from the upstream biological process. Foam entrapment in the membrane tank from the upstream

process can reduce membrane filtration capacity and in turn result in a plant-wide foam problem.

- Reliable access to the membrane modules is key to operation and maintenance. Once PLC is functionary properly, overall maintenance requirements for sustained operation of the system are relatively modest.
- The membranes go through frequent membrane relaxing or back pulse and a periodic deep chemical clean in place (CIP) process.
- Sizing of membrane filtration facilities governed by hydraulic flux. Municipal wastewaters have flux values that range from about 20 to 40 gallons per square foot per day (gfd) under average annual conditions. The flux associated with industrial applications is wastewater specific.

Following the MF is the activated carbon facilities. There are two kinds of activated carbon used in treating water: powdered activated carbon (PAC) and GAC. PAC is finely-ground, loose carbon that is added to water, mixed for a short period of time, and removed. GAC is larger than PAC, is generally used in beds or tanks that permit higher adsorption and easier process control than PAC allows, and is replaced periodically. PAC is not selective, and therefore, will adsorb all active organic substances making it an impractical solution for a wastewater treatment plant. As a result, GAC was considered for this analysis. The type of GAC (e.g., bituminous and subbituminous coal, wood, walnut shells, lignite or peat), gradation, and adsorption capacity are determined by the size of the largest molecule/ contaminant that is being filtered (AWWA, 1990).

As water flows through the carbon bed, contaminants are captured by the surfaces of the pores until the carbon is no longer able to adsorb new molecules. The concentration of the contaminant in the treated effluent starts to increase. Once the contaminant concentration in the treated water reaches an unacceptable level (called the breakthrough concentration), the carbon is considered "spent" and must be replaced by virgin or reactivated GAC.

The capacity of spent GAC can be restored by thermal reactivation. Some systems have the ability to regenerate GAC on-site, but in general, small systems haul away the spent GAC for off-site regeneration (EPA 1993). For this study, off-site regeneration was assumed.

The basic facilities and their potential unit processes included in this chapter are as follows:

- GAC supply and delivery
- Influent pumping
  - Low head feed pumping
  - High head feed pumping (assumed for this study as we have low limits so require high beds)
- Contactors and backwash facilities
  - Custom gravity GAC contactor
  - Pre-engineered pressure GAC contactor (Used for this study)
  - Backwash pumping
- GAC transport facilities
  - Slurry pumps
  - Eductors (Used for this study)
- Storage facilities

  - Steel tanks
  - Concrete tanks (Used for this study; larger plants would typically select concrete tanks)
- Spent carbon regeneration
  - On-site GAC regeneration
  - Off-Site GAC regeneration

Following the MF is the GAC facility. The GAC contactor provides about a 12-min hydraulic residence time for average annual conditions. The GAC media must be regenerated about twice per year in a furnace. The constituents sorbed to the GAC media are removed during the regeneration process. A typical design has full redundancy and additional storage tankage for spent and virgin GAC. Facilities that use GAC need to decide whether they will regenerate GAC on-site or off-site. Due to challenges associated with receiving air emission permits for new furnaces, it was assumed that off-site regeneration would be evaluated.

The key technical and operational challenges associated with the tertiary add-on

GAC units are as follows:

- Nearest vendor to acquire virgin GAC – How frequently can they deliver virgin GAC and what are the hauling costs?
- Contactor selection is typically based on unit cost and flow variation. The concrete contactor is typically more cost effective at higher flows so it was used for this evaluation. The pre-engineered pressure contactor can handle a wider range of flows than a concrete contactor. Additionally, a pressure system requires little maintenance as they are essentially automated
- Periodical contactor backwashing is critical for maintaining the desired hydraulics and control biological growth
- Eductors are preferred over slurry pumps because they have fewer mechanical components. Additionally, the pump with eductors is not in contact with the carbon, which reduces wear.
- Off-site GAC regeneration seems more likely due to the challenges with obtaining an air emissions permit.

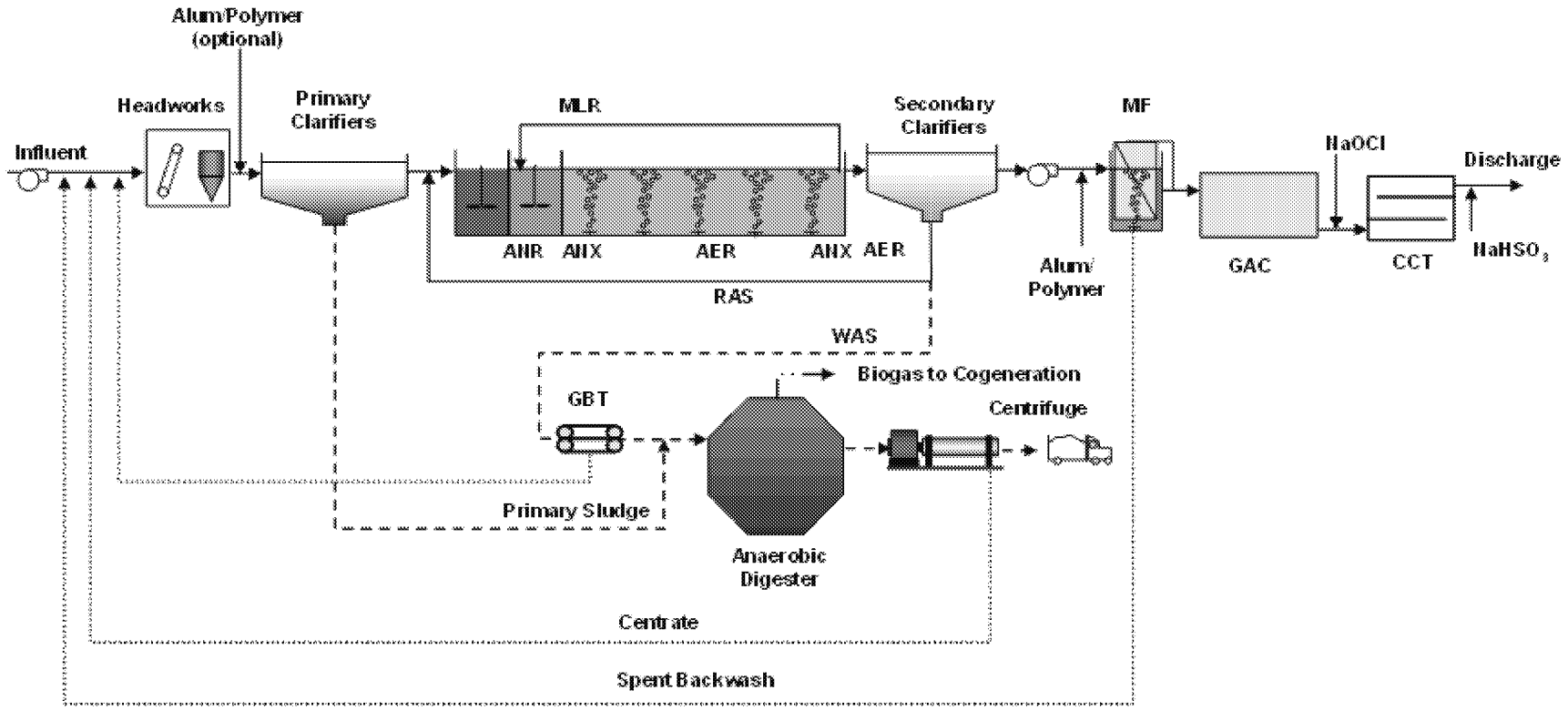

Figure 5. Advanced Treatment Flowsheet – Tertiary Microfiltration and Granular Activated Carbon

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4.5 Steady-State Mass Balance

HDR used its steady-state mass balance program to calculate the flows and loads within the candidate advanced treatment processes as a means to size facilities. The design of wastewater treatment facilities are generally governed by steady-state mass balances. For a steady-state mass balance, the conservation of mass is calculated throughout the entire wastewater treatment facility for defined inputs. Dynamic mass balance programs exist for designing wastewater facilities, but for a planning level study such as this, a steady state mass balance program is adequate. A dynamic program is generally used for detailed design and is site-specific with associated requirements for more detailed wastewater characterization.

The set of model equations used to perform a steady-state mass balance are referred to as the model. The model equations provide a mathematical description of various wastewater treatment processes, such as an activated sludge process, that can be used to predict unit performance. The program relies on equations for each unit process to determine the flow, load, and concentration entering and leaving each unit process.

An example of how the model calculates the flow, load, and concentration for primary clarifiers is provided below. The steady-state mass balance equation for primary clarifiers has a single input and two outputs as shown in the simplified Figure 6. The primary clarifier feed can exit the primary clarifiers as either effluent or sludge. Solids not removed across the primaries leave as primary effluent, whereas solids captured leave as primary sludge. Scum is not accounted for.

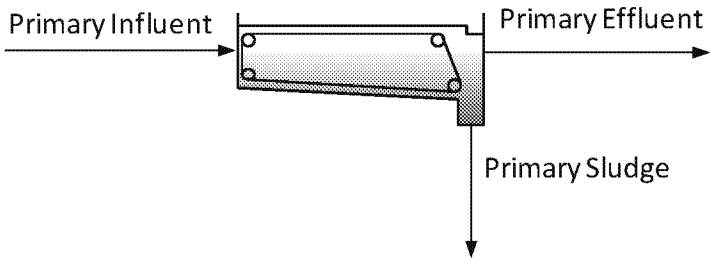

Figure 6. Primary Clarifier Inputs/Outputs

The mass balance calculation requires the following input:

- Solids removal percentage across the primaries (based on average industry accepted performance)
- Primary solids thickness (i.e., percent solids) (based on average industry accepted performance)

The steady-state mass balance program provides a reasonable first estimate for the process performance, and an accurate measure of the flows and mass balances at various points throughout the plant. The mass balance results were used for sizing the facility needs for each alternative. A listing of the unit process sizing criterion for each unit process is provided in Appendix A. By listing the unit process sizing criteria, a third-party user could redo the analysis and end up with comparable results. The key sizing criteria that differ between the baseline and treatment alternatives are as follows:

- Aeration basin mixed liquor is greater for the advanced treatment alternatives which in turn requires a larger volume
- The secondary clarifiers are sized based on hydraulic loading for the baseline versus solids loading for the advanced treatment alternatives

- The MF/GAC and MF/RO sizing is only required for the respective advanced treatment alternatives.

4.6 Adverse Environmental Impacts Associated with Advanced Treatment Technologies

The transition from the baseline (conventional secondary treatment) to either advanced treatment alternatives has some environmental impacts that merit consideration, including the following:

- Land area for additional system components (which for constrained facility sites, may necessitate land acquisition and encroachment into neighboring properties with associated issues and challenges, etc.).
- Increased energy use and atmospheric emissions of greenhouse gases and criteria air contaminants associated with power generation to meet new pumping requirements across the membrane filter systems (MF and RO) and GAC.
- Increased chemical demand associated with membrane filters (MF and RO).
- Energy and atmospheric emissions associated with granulated charcoal regeneration.
- RO brine reject disposal. The zero liquid discharge systems are energy intensive energy and increase atmospheric emissions as a consequence of the electrical power generation required for removing water content from brine reject.
- Increase in sludge generation while transitioning from the baseline to the advanced treatment alternatives. There will be additional sludge captured with the chemical addition to the primaries and membrane filters (MF and RO). Additionally, the GAC units will capture more solids.
- Benefits to receiving water quality by transitioning from a short SRT (<2 days) in the baseline to a long SRT (>8 days) for the advanced treatment alternatives (as previously stated):
    - Lower BOD/TSS discharge load
    - Higher removal of recalcitrant constituents and heavy metals
    - Improved water quality and benefit to downstream users
    - Reduced nutrient loadings to receiving waters and lower algal growth potential
    - Reduced receiving water dissolved oxygen demand due to ammonia removal
    - Reduced ammonia discharge loads, which is toxic to aquatic species
    - Improved water quality for habitat, especially as it relates to biodiversity and eutrophication
    - Secondary clarifier effluent better conditioned for subsequent filtration and disinfection
    - Greater process stability from the anaerobic/anoxic zones serving as a biological selectors

HDR calculated GHG emissions for the baseline and advanced treatment alternatives. The use of GHG emissions is a tool to normalize the role of energy, chemicals, biosolids hauling, and fugitive emissions (e.g., methane) in a single unit. The mass balance results were used to quantify energy demand and the corresponding GHG emissions for each alterative. Energy

demand was estimated from preliminary process calculations. A listing of the energy demand for each process stream, the daily energy demand, and the unit energy demand is provided in Table 9. The advanced treatment options range from 2.3 to 4.1 times greater than the baseline. This large increase in energy demand is attributed to the energy required to pass water through the membrane barriers and/or the granular activated carbon. Additionally, there is energy required to handle the constituents removed as either regenerating the GAC or handling the RO brine reject water. This additional energy required to treat the removed constituents is presented in Table 9.

Table 9. Energy Breakdown for Each Alternative (5 mgd design flow)

Parameter	Units	Baseline	Advanced Treatment – MF/GAC	Advanced Treatment – MF/RO
Daily Liquid Stream Energy Demand	MWh/d	11.6	23.8	40.8
Daily Solids Stream Energy Demand	MWh/d	-1.6	-1.1	-1.1
Daily Energy Demand	MWh/d	10.0	22.7	39.7
Unit Energy Demand	kWh/MG Treated	2,000	4,500	7,900

MWh/d = megawatt hours per day
kWh/MG = kilowatt hours per million gallons

Details on the assumptions used to convert between energy demand, chemical demand and production, as well as biologically-mediated gases (i.e., CH4 and N2O) and GHG emissions are provided in Appendix B.

A plot of the GHG emissions for each alternative is shown in Figure 7. The GHG emissions increase from the baseline to the two advanced treatment alternatives. The GHG emissions increase about 50 percent with respect to baseline when MF/GAC is used and the GHG emissions increase over 100 percent with respect to baseline with the MF/RO advanced treatment alternative.

The MF/GAC energy demand would be larger if GAC regeneration was performed on-site. The GHG emissions do not include the energy or air emissions that result from off-site GAC regeneration. Only the hauling associated with moving spent GAC is included. The energy associated with operating the furnace would exceed the GHG emissions from hauling spent GAC.

The zero liquid discharge in the MF/RO alternative alone is comparable to the Baseline. This contribution to increased GHG emissions by zero liquid discharge brine system highlights the importance of the challenges associated with managing brine reject.

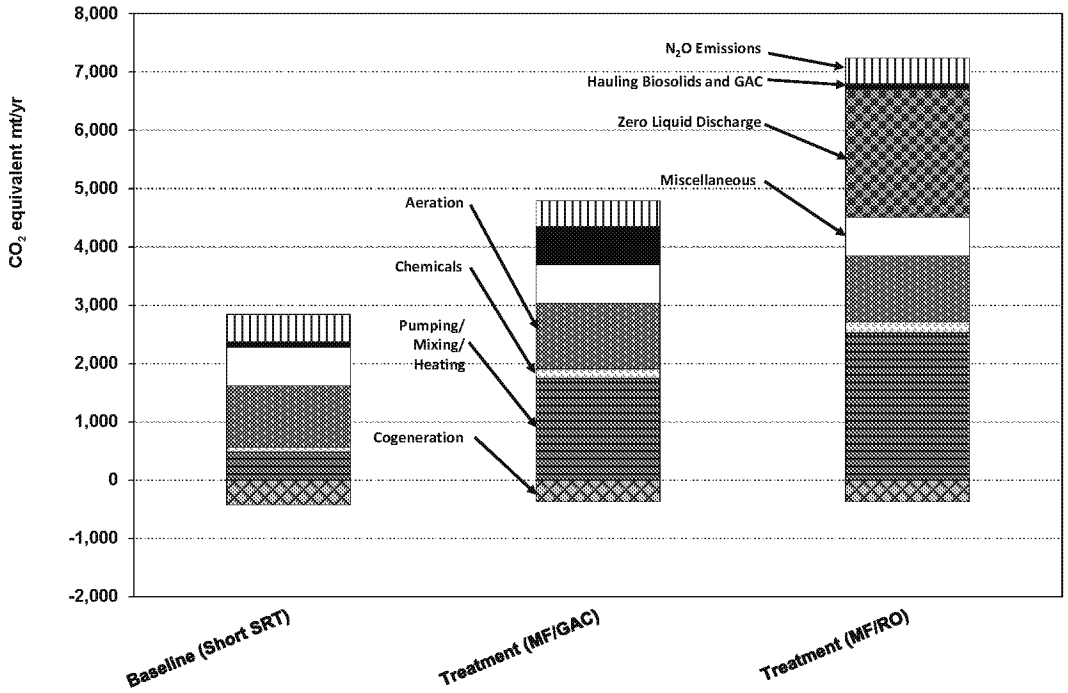

Figure 7. Greenhouse Gas Emissions for Each Alternative

The use of GHG emissions as a measure of sustainability does not constitute a complete comparison between the baseline and advanced treatment alternatives. Rather, it is one metric that captures the impacts of energy, chemical demand and production, as well as biologically-mediated gases (i.e., CH_4 and N_2O). The other environmental impacts of advanced treatment summarized in the list above should also be considered in decision making beyond cost analysis.

4.7 Costs

Total project costs along with the operations and maintenance costs were developed for each advanced treatment alternative for a comparison with baseline secondary treatment.

4.7.1 Approach

The cost estimates presented in this report are planning level opinions of probable construction costs for a nominal 5 mgd treatment plant design flow representing a typical facility without site specific details about local wastewater characteristics, physical site constraints, existing infrastructure, etc. The cost estimates are based on wastewater industry cost references, technical studies, actual project cost histories, and professional experience. The costs presented in this report are considered planning level estimates. A more detailed development of the advanced treatment process alternatives and site specific information would be required to further refine the cost estimates. Commonly this is accomplished in the preliminary design phase of project development for specific facilities following planning.

The cost opinion includes a range of costs associated with the level of detail used in this analysis. Cost opinions based on preliminary engineering can be expected to follow the Association for the Advancement of Cost Engineering (AACE International) Recommended Practice No. 17R-97 Cost Estimate Classification System estimate Class 4. A Class 4 estimate is based upon a 5 to 10 percent project definition and has an expected accuracy range of -30 to +50 percent and typical end usage of budget authorization and cost control. It is considered an

"order-of-magnitude estimate." The life-cycle costs were prepared using the net present value (NPV) method.

The cost associated for each new unit process is based on a unit variable, such as required footprint, volume, demand (e.g., lb O_2/hr), and others. This approach is consistent with the approach developed for the EPA document titled "Estimating Water Treatment Costs: Volume 2-Cost Curves Applicable to 1 to 200 mgd Treatment Plants" dated August 1979. The approach has been updated since 1979 to account for inflation and competition, but the philosophy for estimating costs for unit processes has not changed. For example, the aeration system sizing/cost is governed by the maximum month airflow demand. Additionally, the cost associated constructing an aeration basin is based on the volume. The cost considers economies of scale.

The O&M cost estimates were calculated from preliminary process calculations. The operations cost includes energy and chemical demand. For example, a chemical dose was assumed based on industry accepted dosing rates and the corresponding annual chemical cost for that particular chemical was accounted for. The maintenance values only considered replacement equipment, specifically membrane replacement for the Advanced Treatment Alternatives.

4.7.2 Unit Cost Values

The life-cycle cost evaluation was based on using the economic assumptions shown in Table 10. The chemical costs were based on actual values from other projects. To perform detailed cost evaluations per industry, each selected technology would need to be laid out on their respective site plan based on the location of the existing piping, channels, and other necessary facilities.

Table 10. Economic Evaluation Variables

Item	Value
Nominal Discount Rate	5%
Inflation Rate:	
General	3.5%
Labor	3.5%
Energy	3.5%
Chemical	3.5%
Base Year	2013
Project Life	25 years
Energy	$0.06/kWh
Natural Gas	$0.60/therm
Chemicals:	
Alum	$1.1/gal
Polymer	$1.5/gal
Hypochlorite	$1.5/gal
Salt	$0.125/lb
Antiscalant	$12.5/lb
Acid	$0.35/lb
Deionized Water	$3.75/1,000 gal

Table 10. Economic Evaluation Variables

Item	Value
Hauling	
Biosolids Hauling Distance	100 miles (one way)
Biosolids Truck Volume	6,000 gal/truck
Biosolids Truck Hauling	$250/truck trip
GAC Regeneration Hauling Distance	250 miles (round trip)
GAC Regeneration Truck Volume	$20,000 lb GAC/truck
GAC Regeneration Truck Hauling	Included in cost of Virgin GAC

4.7.3 Net Present Value of Total Project Costs and Operations and Maintenance Cost in 2013 Dollars

An estimate of the net present value for the baseline treatment process and the incremental cost to implement the advanced treatment alternatives is shown in Table 11. The cost for the existing baseline treatment process was estimated based on new construction for the entire conventional secondary treatment process (Figure 3). The incremental cost to expand from existing baseline secondary treatment to advanced treatment was calculated by taking the difference between the baseline and the advanced treatment alternatives. These values serve as a benchmark for understanding the prospective cost for constructing advanced treatment at the planning level of process development.

Table 11. Treatment Technology Total Project Costs in 2013 Dollars for a 5 mgd Facility

Alternative	Total Construction Cost, 2013 dollars ($ Million)	O&M Net Present Value, 2013 dollars ($ Million) *	Total Net Present Value, 2013 dollars ($ Million)	NPV Unit Cost, 2013 dollars ($/gpd)
Baseline (Conventional Secondary Treatment) *	59 - 127	5 - 11	65 – 138	13 - 28
Advanced Treatment – MF/RO **	108 - 231	31 - 67	139 - 298	28 - 60
Advanced Treatment – MF/GAC	131 - 280	50 - 108	181 - 388	36 - 78
Incremental Increase to Advanced Treatment MF/RO	48 - 104	26 - 56	75 - 160	15 - 32
Incremental Increase to Advanced Treatment MF/GAC	71 - 153	45 - 97	117 - 250	23 - 50

* The additional cost to increase the SRT to upwards of 30-days is about $12 - 20 million additional dollars in total project cost for a 5 mgd design flow

** Assumes zero liquid discharge for RO brine management, followed by evaporation ponds. Other options are available as listed in Section 4.4.2.

4.7.4 Unit Cost Assessment

Costs presented above are based on a treatment capacity of 5.0 mgd, however, existing treatment facilities range dramatically across Washington in size and flow treated. Table 11 indicates that the unit capital cost for baseline conventional secondary treatment for 5.0 mgd ranges between $13 to 28 per gallon per day of treatment capacity. The unit cost for the advanced treatment alternatives increases the range from the low $20s to upper $70s on a per-gallon per-day of capacity. The increase in cost for the advanced treatment alternatives is discussed in the sub-sections below.

Advanced Treatment MF/RO

The advanced treatment MF/RO alternative has a total present worth unit cost range of $28 to $60 million in per gallon per day of capacity. This translates to an incremental cost increase with respect to the baseline of $15 to $32 million dollars in per gallon per day treatment capacity. The key differences in cost between the baseline and the advanced treatment MF/RO are as follows:

- Larger aeration basins than the baseline to account for the longer SRT (<8 days versus >8 days).
- Additional pumping stations to pass water through the membrane facilities (MF and RO). These are based on peak flows.
- Membrane facilities (MF and RO; equipment, tanks chemical feed facilities, pumping, etc.) and replacement membrane equipment.
- Additional energy and chemical demand to operate the membrane facilities (MF and RO) and GAC.
- Zero liquid discharge facilities to further concentrate the brine reject.
- Zero liquid discharge facilities are energy/chemically intensive and they require membrane replacement every few years due to the brine reject water quality.
- An evaporation pond to handle the brine reject that has undergone further concentration by zero liquid discharge.

The advanced treatment MF/RO assumes that 100 percent of the flow is treated by MF, followed by 50 percent of the flow treated with RO. Sending a portion of flow through the RO and blending it with the balance of plant flows ensures a stable water to discharge. The RO brine reject (about 1.0 mgd) undergoes ZLD pre-treatment that further concentrates the brine reject to about 0.1-0.5 mgd. The recovery for both RO and ZLD processes is highly dependent on water quality (e.g., silicate levels).

ZLD technologies are effective at concentrating brine reject, but it comes at a substantial cost ($17.5 per gallon per day of ZLD treatment capacity of brine reject). The zero liquid discharge estimate was similar in approach to the demonstration study by Burbano and Brandhuber (2012) for La Junta, Colorado. The ability to further concentrate brine reject was critical from a management standpoint. Although 8 different options were presented for managing brine reject in Section 4.4.2, none of them is an attractive approach for handling brine reject. ZLD provides a viable pre-treatment step that requires subsequent downstream treatment. Evaporation ponds following ZLD were used for this study. Without ZLD, the footprint would be 3-5 times greater.

Roughly 30 acres of evaporation ponds are required (25-year life-span) to handle the ZLD concentrate. This area requirement accounts for the moist climate of AWB members. However, precipitation throughout Washington is highly variable which can greatly influence evaporation

pond footprint. The approach for costing the evaporation pond was in accordance with Mickley et al. (2006) and the cost was about $2.6 million.

Recent discussions with an industry installing evaporation ponds revealed that they will use mechanical evaporators to enhance evaporation rates. The use of mechanical evaporators was not included in this study, but merits consideration if a facility is performing a preliminary design that involves evaporation ponds. The mechanical evaporators have both a capital costs and annual energy costs.

Advanced Treatment MF/GAC

The advanced treatment MF/GAC alternative has a total present worth unit cost range of $36 to $78 million in per gallon per day capacity. This translates to an incremental cost increase with respect to the baseline of $23 to $50 million dollars on a per gallon per day of treatment capacity basis. The key differences in cost between the baseline and the advanced treatment MF/GAC are as follows:

- Larger aeration basins than the baseline to account for the longer SRT (<8 days versus >8 days).
- Additional pumping stations to pass water through the MF membrane and GAC facilities. These are based on peak flows.
- GAC facilities (equipment, contact tanks, pumping, GAC media, etc.)
- Additional energy to feed and backwash the GAC facilities.
- GAC media replacement was the largest contributor of any of the costs.
- Additional hauling and fees to regenerate GAC off-site.

The advanced treatment MF/GAC assumes that 100 percent of the flow is treated by MF, followed by 100 percent of the flow treated with GAC. The GAC technology is an established technology. The costing approach was in accordance with EPA guidelines developed in 1998.

The critical issue while costing the GAC technology is whether a GAC vendor/regeneration facility is located within the region. On-site regeneration is an established technology with a furnace.

However, there are several concerns as listed in Section 4.4.3:

- Ability to obtain an air emissions permit
- Additional equipment to operate and maintain
- Energy and air emissions to operate a furnace on-site
- Operational planning to ensure that furnace is operating 90-95 percent of the time. Otherwise, operations is constantly starting/stopping the furnace which is energy intensive and deleterious to equipment
- If not operated properly, the facility has the potential to create hazardous/toxic waste to be disposed

If located within a couple hundred miles, off-site regeneration is preferred. For this study, off-site regeneration was assumed with a 250-mile (one-way) distance to the nearest vendor that can provide virgin GAC and a regeneration facility.

Incremental Treatment Cost

The difference in costs between the baseline and the advanced treatment alternatives is listed in Table 11. The incremental cost to retrofit the baseline facility to the advanced treatment was calculated by taking the difference between the two alternatives. These values should serve as a planning level benchmark for understanding the potential cost for retrofitting a particular facility. The incremental cost is unique to a particular facility. Several reasons for the wide range in cost in retrofitting a baseline facility to advanced treatment are summarized as follows:

- Physical plant site constraints. A particular treatment technology may or may not fit within the constrained particular plant site. A more expensive technology solution that is more compact may be required. Alternately, land acquisition may be necessary to enlarge a plant site to allow the addition of advanced treatment facilities. An example of the former is stacking treatment processes vertically to account for footprint constraints. This is an additional financial burden that would not be captured in the incremental costs presented in Table 11.
- Yard piping. Site specific conditions may prevent the most efficient layout and piping arrangement for an individual facility. This could lead to additional piping and pumping to convey the wastewater through the plant. This is an additional financial burden that would not be captured in the incremental costs presented in Table 11.
- Pumping stations. Each facility has unique hydraulic challenges that might require additional pumping stations not captured in this planning level analysis. This is an additional financial burden that would not be captured in the incremental costs presented in Table 11.

A cursory unit cost assessment was completed to evaluate how costs would compare for facilities with lower (0.5 mgd) and higher capacity (25 mgd). Capital costs were also evaluated for a 0.5 mgd and 25 mgd facility using non-linear scaling equations with scaling exponents. The unit capital cost for baseline conventional secondary treatment for 0.5 mgd and 25 mgd is approximately $44 and $10 per gallon per day of treatment capacity, respectively. The incremental unit costs to implement an advanced treatment retrofit for 0.5 mgd would range between $30 to $96 per gallon per day of treatment capacity and would be site and discharger specific. The incremental unit costs to implement an advanced treatment retrofit for 25 mgd would range between $10 to 35 per gallon per day of treatment capacity and would be site and discharger specific. The larger flow, 25 mgd, is not as expensive on a per gallon per day of treatment capacity. This discrepancy for the 0.5 and 25 mgd cost per gallon per day of treatment capacity is attributed to economies of scale. Cost curve comparisons (potential total construction cost and total net present value) for the baseline and the two tertiary treatment options (MF/RO and MF/GAC) are shown in Figure 8 and Figure 9 between the flows of 0.5 and 25 mgd.

Table 12. Treatment Technology Total Project Costs in 2013 Dollars for a 0.5 mgd Facility and a 25 mgd Facility

Alternative	Total Construction Cost, 2013 dollars ($ Million)	O&M Net Present Value, 2013 dollars ($ Million) *	Total Net Present Value, 2013 dollars ($ Million)	NPV Unit Cost, 2013 dollars ($/gpd)
0.5 mgd:				
Baseline (Conventional Secondary Treatment)	15 - 32	0.5 - 1.1	15 - 33	31 - 66
Advanced Treatment – MF/RO **	27 - 58	3.2 - 6.8	30 - 65	60 - 130
Advanced Treatment – MF/GAC	33 - 70	5 - 10.8	38 - 81	76 - 162
Incremental Increase to Advanced Treatment MF/RO	12 - 26	2.7 - 5.7	15 - 32	30 - 64
Incremental Increase to Advanced Treatment MF/GAC	18 - 38	4.6 - 9.8	22 - 48	45 - 96
25 mgd:				
Baseline (Conventional Secondary Treatment)	156 - 335	25 - 54	182 - 389	7 - 16
Advanced Treatment – MF/RO **	283 - 606	157 - 336	440 - 942	18 - 38
Advanced Treatment – MF/GAC	343 - 735	252 - 541	595 - 1276	24 - 51
Incremental Increase to Advanced Treatment MF/RO	127 - 272	131 - 281	258 - 553	10 - 22
Incremental Increase to Advanced Treatment MF/GAC	187 - 401	226.9 - 486	414 - 887	17 - 35

* Does not include the cost for labor.

** Assumes zero liquid discharge for RO brine management, followed by evaporation ponds. Other options are available as listed in Section 4.4.2.

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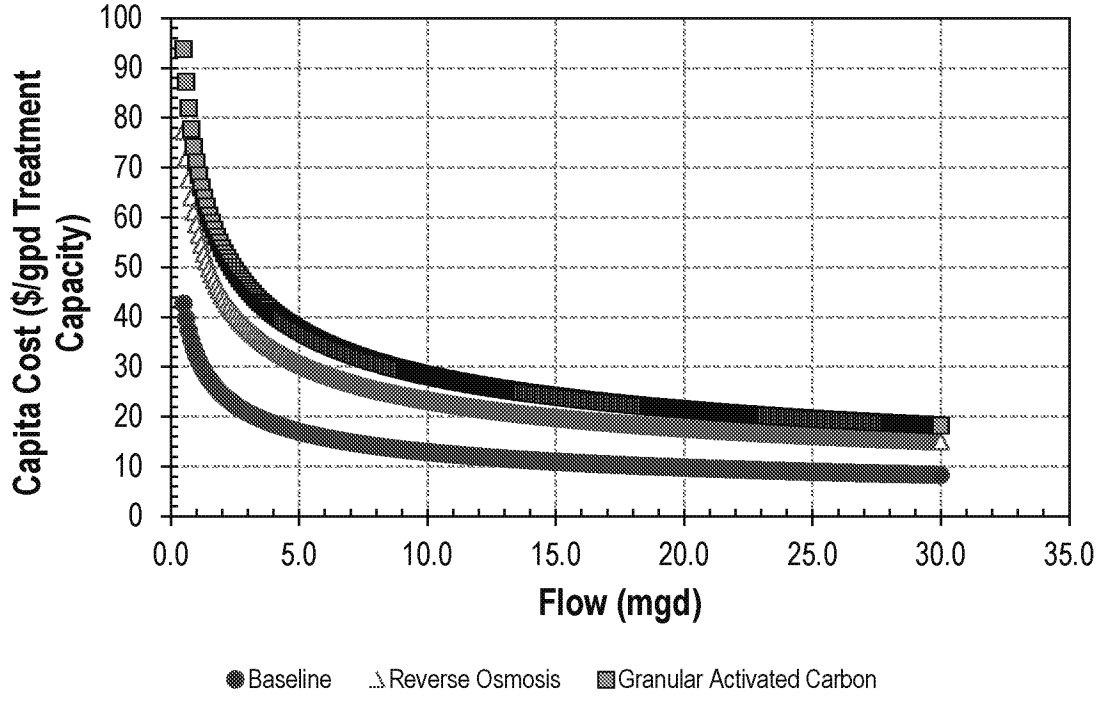

Figure 8: Capital Cost Curve Comparison for Baseline Treatment, MF/RO, and MF/GAC

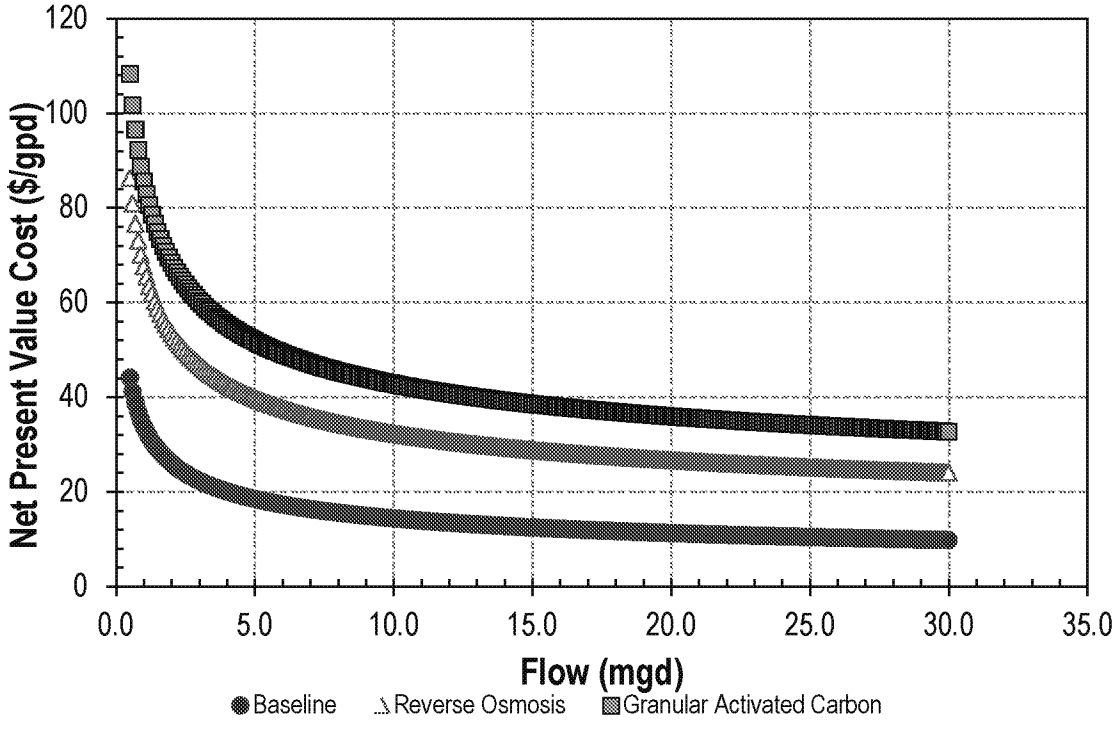

Figure 9: NPV Cost Curve Comparison for Baseline Treatment, MF/RO, and MF/GAC

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4.8 Pollutant Mass Removal

An estimate of the projected load removal for the four constituents of concern was developed and is presented in Table 13. The current secondary effluent and advanced treatment effluent data is based on the only available data to HDR and is from municipal treatment plant facilities. Data is not available for advanced treatment facilities such as MF/RO or MF/GAC. Due to this lack of data, advanced treatment using MF/RO or MF/GAC was assumed to remove an additional zero to 90 percent of the constituents presented resulting in the range presented in Table 13. It is critical to note these estimates are based on limited data and are presented here simply for calculating mass removals. Current secondary effluent for industrial facilities would likely be greater than the data presented here and as a result, the projected effluent quality for industrial facilities would likely be higher as well. Based on the limited actual data from municipal treatment facilities, Table 13 indicates that mercury and BAP effluent limits may potentially be met using advanced treatment at facilities with similar existing secondary effluent quality.

Table 13. Pollutant Mass Removal by Contaminant for a 5 mgd Facility

Component	PCBs	Mercury	Arsenic	BAP
Required HHWQC based Effluent Quality (µg/L)	0.0000064	0.005	0.018	0.0013
Current Secondary Effluent Concentration (µg/L)*	0.0015	0.025	7.5	0.00031
Projected Effluent Quality (µg/L) from Advanced Treatment (MF/RO or MF/GAC)*	0.000041 – 0.00041	0.00012 – 0.0012	0.38 – 3.8	0.000029 - 0.00029
Mass Removed (mg/d)**	21 - 28	451 - 471	71,000 – 135,000	0.4 – 5.0
Mass Removed (lb/d)**	0.000045 – 0.000061	0.00099 – 0.0010	0.16 – 0.30	0.0000010 – 0.0000012

* Based on or estimated for actual treatment plant data from municipal facilities. Data sets are limited and current secondary effluent for industrial facilities would likely be greater than the data presented here.
** 1 lb = 454,000 mg

Unit costs were developed based on required mass removal from a 5 mgd facility for each of the four constituents of concern to reduce discharges from current secondary effluent quality to the assumed required effluent quality (HHWQC). It important to note that this study concludes it is unclear if existing technology can meet the required effluent quality, however, the information presented in Table 14 assumes HHWQC would be met for developing unit costs. The unit costs are expressed as dollars in NPV (over a 25 year period) per pound of constituent removed over the same 25 year period using advanced treatment with MF/RO. The current secondary effluent quality data presented are based on typical secondary effluent quality expected for a municipal/industrial discharger. Table 14 suggests unit costs are most significant in meeting the PCB, mercury, and PAH required effluent quality.

Table 14. Unit Cost by Contaminant for a 5 mgd Facility Implementing Advanced Treatment using MF/RO

Component	PCBs	Mercury	Arsenic	PAHs
Required HHWQC based Effluent Quality (µg/L)	0.0000064	0.005	0.018	0.0013
Current Secondary Effluent Concentration (µg/L)*	0.002	0.025	7.5	0.006
Total Mass Removed (lbs) over 25 year Period	0.76	7.6	2,800	1.8
Unit Cost (NPV per total mass removed in pounds over 25 years)	$290,000,000	$29,000,000	$77,000	$120,000,000

*Derived from data presented in Table 3.
**Based on assumed 25-year NPV of $219,000,000 (average of the range presented in Table 10) and advanced treatment using MF/RO.

4.9 Sensitivity Analysis

The ability of dischargers to meet a HHWQC one order of magnitude less stringent (than HHWQC presented in Table 3 and used in this report) was considered. The same advanced treatment technologies using MF/RO or MF/GAC would still be applied to meet revised effluent quality one order-of-magnitude less stringent despite still not being able to meet less stringent effluent limits. As a result, this less stringent effluent quality would not impact costs. Based on available data, it appears the mercury and PAH limits would be met at a less stringent HHWQC. PCB effluent quality could potentially be met if advanced treatment with RO or GAC performed at the upper range of their projected treatment efficiency. It does not appear the less stingent arsenic HHWQC would be met with advanced treatment. It is important to note that a discharger's ability to meet these less stringent limits depends on existing secondary effluent characteristics and is facility specific. Facilities with higher secondary effluent constituent concentrations will have greater difficulty meeting HHWQC.

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5.0 Summary and Conclusions

This study evaluated treatment technologies potentially capable of meeting revised effluent discharge limits associated with revised HHWQC. HDR completed a literature review of potential technologies and engineering review of their capabilities to evaluate and screen treatment methods for meeting revised effluent limits for four constituents of concern: arsenic, BAP, mercury, and PCBs. HDR selected two alternatives to compare against a baseline, including enhanced secondary treatment, enhanced secondary treatment with MF/RO, and enhanced secondary treatment with MF/GAC. HDR developed capital costs, operating costs, and a NPV for each alternative, including the incremental cost to implement from an existing secondary treatment facility.

The following conclusions can be made from this study.

- Revised HHWQC based on state of Oregon HHWQC (2001) and EPA "National Recommended Water Quality Criteria" will result in very low water quality criteria for toxic constituents.
- There are limited "proven" technologies available for dischargers to meet required effluent quality limits that would be derived from revised HHWQC.
    - Current secondary wastewater treatment facilities provide high degrees of removal for toxic constituents; however, they will not be capable of compliance with water quality-based NPDES permit effluent limits derived from revised HHWQC.
    - Advanced treatment technologies have been investigated and candidate process trains have been conceptualized for toxics removal.
        - Advanced wastewater treatment technologies may enhance toxics removal rates, however they will not be capable of compliance with HHWQC based effluent limits for PCBs. The lowest levels achieved based on the literature review were between <0.00001 and 0.00004 µg/L, as compared to a HHWQC of 0.0000064 µg/L.
        - Based on very limited performance data for arsenic and mercury from advanced treatment information available in the technical literature, compliance with revised criteria may or may not be possible, depending upon site specific circumstances.
            - Compliance with a HHWQC for arsenic of 0.018 µg/L appears unlikely. Most treatment technology performance information available in the literature is based on drinking water treatment applications targeting a much higher SDWA MCL of 10 µg/L.
            - Compliance with a HHWQC for mercury of 0.005 µg/L appears to be potentially attainable on an average basis but perhaps not if effluent limits are structured on a maximum monthly, weekly or daily basis. Some secondary treatment facilities attain average effluent mercury levels of 0.009 to 0.066 µg/L. Some treatment facilities with effluent filters attain average effluent mercury levels of 0.002 to 0.010 µg/L. Additional advanced treatment processes are expected to enhance these removal rates, but little mercury performance data is available for a definitive assessment.

        - Little information is available to assess the potential for advanced technologies to comply with revised benzo(a)pyrene criteria.
    - Some technologies may be effective at treating identified constituents of concern to meet revised limits while others may not. It is therefore even more challenging to identify a technology that can meet all constituent limits simultaneously.
    - A HHWQC that is one order-of-magnitude less stringent could likely be met for mercury and PAHs however it appears PCB and arsenic limits would not be met.
- Advanced treatment processes incur significant capital and operating costs.
    - Advanced treatment process to remove additional arsenic, benzo(a)pyrene, mercury, and PCBs would combine enhancements to secondary treatment with microfiltration membranes, reverse osmosis, and granular activated carbon and increase the estimated capital cost of treatment from $17 to $29 in dollars per gallon per day of capacity (based on a 5.0 mgd facility).
    - The annual operation and maintenance costs for the advanced treatment process train will be substantially higher (approximately $5 million - $15 million increase for a 5.0 mgd capacity facility) than the current secondary treatment level.
- Implementation of additional treatment will result in additional collateral impacts.
    - High energy consumption.
    - Increased greenhouse gas emissions.
    - Increase in solids production from chemical addition to the primaries. Additionally, the membrane and GAC facilities will capture more solids that require handling.
- It appears advanced treatment technology alone cannot meet all revised water quality limits and implementation tools are necessary for discharger compliance.
    - Implementation flexibility will be necessary to reconcile the difference between the capabilities of treatment processes and the potential for HHWQC driven water quality based effluent limits to be lower than attainable with technology

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7.0 Appendices

- Appendix A - Unit Process Sizing Criteria
- Appendix B - Greenhouse Gas Emissions Calculation Assumptions

APPENDIX A - UNIT PROCESS SIZING CRITERIA

Table A-1. Unit Processes Sizing Criteria for Each Alternative

Unit Process	Units	Baseline Treatment	Advanced Treatment	Comment
Influent Pumping Station	unitless	3 Times Ave Flow	3 Times Ave Flow	This is peaking factor used to size the pumps (peak flow:average flow)
Alum Dose for CEPT (optional)	mg/L	20	20	This is the metal salt upstream of the primaries
Primary Clarifiers	gpd/sf	1000	1000	This is for average annual flows
Primary Solids Pumping Station	unitless	1.25 Times Ave Flow	1.25 Times Ave Flow	This is peaking factor used to size the pumps (maximum month flow:average flow)
Aeration System Oxygen Uptake Rate (OUR)	mg/L/hr	25	25	Average annual OUR is used in tandem with mixed liquor to determine the required aeration basin volume (the limiting parameter governs the activated sludge basin volume)
Aeration Basin Mixed Liquor	mg/L	1250	2500	Average annual mixed liquor is used in tandem with OUR (see next row) to determine the required aeration basin volume (the limiting parameter governs the activated sludge basin volume)
Secondary Clarifiers Hydraulic Loading	gpd/sf	650	--	Only use for Baseline as clarifiers governed hydraulically with short SRT (<2 days)
Secondary Clarifiers Solids Loading	lb/d/sf	--	24	Only use for Advanced Treatment as clarifiers governed by solids with long SRT (>8 days)
Return Activated Sludge (RAS) Pumping Station	unitless	1.25 Times Ave Flow	1.25 Times Ave Flow	RAS must have capacity to meet 100% influent max month Flow. The influent flow is multiplied by this peaking factor to determine RAS pumping station capacity.
Waste Activated Sludge (WAS) Pumping Station	gpm	1.25 Times Ave Flow	1.25 Times Ave Flow	WAS must have capacity to meet max month WAS flows. The average annual WAS flow is multiplied by this peaking factor to determine WAS pumping station capacity.
Microfiltration (MF) Flux	gfd	--	25	Based on average annual pilot experience in Coeur D'Alene, ID
MF Backwash Storage Tank	unitless	--	1.25	Storage tanks must have capacity to meet maximum month MF backwash flows. The average annual MF backwash volume is multiplied by this peaking factor to determine required volume.

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Table A-1. Unit Processes Sizing Criteria for Each Alternative

Unit Process	Units	Baseline Treatment	Advanced Treatment	Comment
MF Backwash Pumps	unitless	--	1.25	Backwash pumps must have capacity to meet maximum month MF backwash flows. The average annual MF backwash flow is multiplied by this peaking factor to determine required flows.
Reverse Osmosis (RO)	gallon per square foot per day (gfd)	--	10	
RO Reject	%	--	20	This represents the percentage of feed flow that is rejected as brine
Chlorination Dose	mg/L	15	15	
Chlorination Storage Capacity	days	14	14	
Chlorine Contact Tank	min	30	30	This is for average annual conditions.
Dechlorination Dose	mg/L	15	15	
Dechlorination Storage Capacity	days	14	14	
Gravity Belt Thickener	gpm/m	200	200	This is for maximum month conditions using the 1.25 peaking factor from average annual to maximum month
Anaerobic Digestion	Hydraulic residence time (HRT)	18	18	This is for average annual conditions
Dewatering Centrifuge	gpm	120	120	This is for maximum month conditions using the 1.25 peaking factor from average annual to maximum month

gpd=gallons per day; sf=square feet; gpm=gallons per minute

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Appendix B – Greenhouse Gas Emissions Calculation Assumptions

The steady state mass balance results were used to calculate GHG emissions. The assumptions used to convert between energy demand, chemical demand and production, as well as biologically-mediated gases (i.e., CH4 and N2O) and GHG emissions are provided in Table B-1. The assumptions are based on EPA (2007) values for energy production, an adaptation of the database provided in Ahn et al. (2010) for N2O emissions contribution, Intergovernmental Panel on Climate Change (IPCC) (2006) for fugitive CH4 emissions, and various resources for chemical production and hauling from production to the wastewater treatment plant (WWTP). Additionally, the biogas produced during anaerobic digestion that is used as a fuel source is converted to energy with MOP8 (2009) recommended waste-to-energy values.

Table B-1. Greenhouse Gas Emissions Assumptions

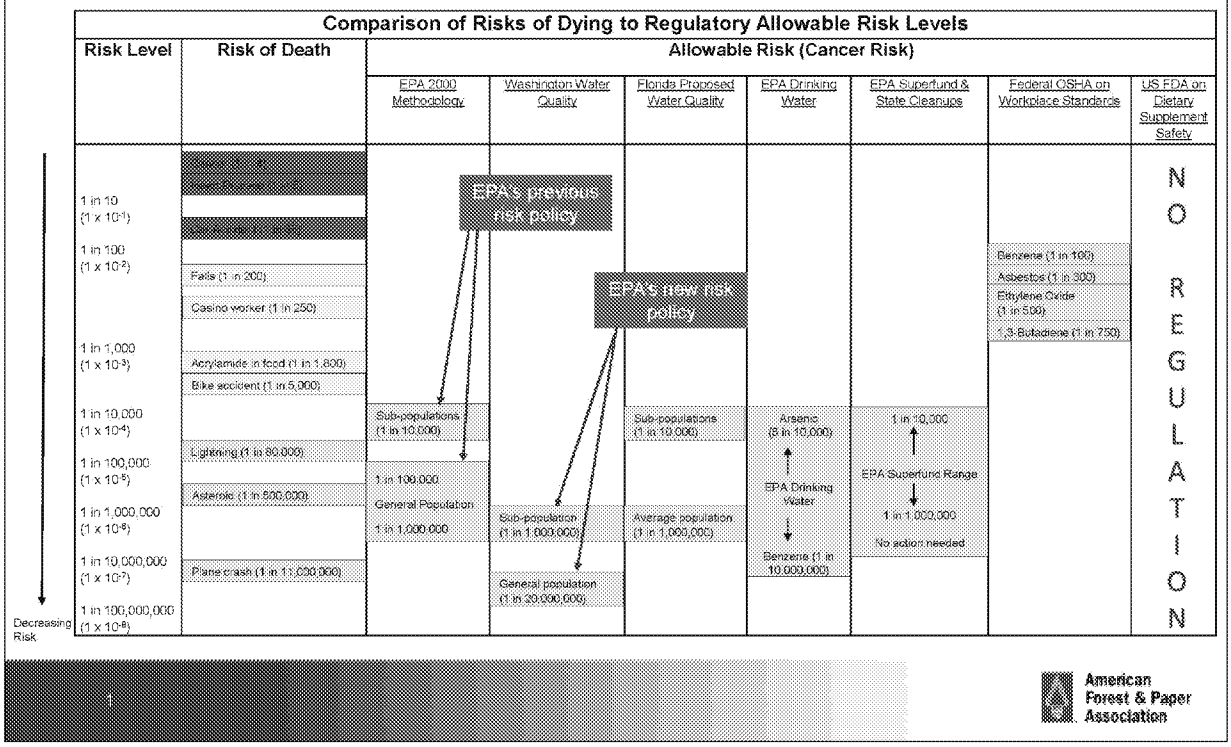
Parameters	Units	Value	Source
N_2O to CO_2 Conversion	lb CO_2/lb N_2O	296	IPCC, 2006
CH_4 to CO_2 Conversion	lb CO_2/lb CH_4	23	IPCC, 2006
Energy Production			
CO_2	lb CO_2/MWh	1,329	USEPA (2007)
N_2O	lb N_2O/GWh	20.6	USEPA (2007)
CH_4	lb CO_2/GWh	27.3	USEPA (2007)
Sum Energy Production	lb CO_2/MWh	1336	USEPA (2007)
GHGs per BTU Natural Gas			
CO_2	lb CO_2/MMBTU Natural Gas	52.9	CA Climate Action Registry Reporting Tool
N_2O	lb N_2O/MMBTU Natural Gas	0.0001	CA Climate Action Registry Reporting Tool
CH_4	lb CO_2/MMBTU Natural Gas	0.0059	CA Climate Action Registry Reporting Tool
Sum Natural Gas		53.1	CA Climate Action Registry Reporting Tool
Non-BNR N_2O Emissions	g N_2O/PE/yr	32	Ahn et al. (2010)
BNR N_2O Emissions	g N_2O/PE/yr	30	Ahn et al. (2010)
Biogas Purity	% Methane	65	WEF, 2009
Biogas to Energy	BTU/cf CH4	550	WEF, 2009
Digester Gas to Electrical Energy Transfer Efficiency	%	32	HDR Data

Table B-1. Greenhouse Gas Emissions Assumptions

Parameters	Units	Value	Source
Chemical Production			
Alum	lb CO_2/lb Alum	0.28	SimaPro 6.0 - BUWAL250, Eco-indicator 95
Polymer	lb CO_2/lb Polymer	1.18	Owen (1982)
Sodium Hypochlorite	lb CO_2/lb Sodium Hypochlorite	1.07	Owen (1982)
Building Energy Efficiency	kBTU/sf/yr	60	Calif. Commercial End-Use Survey (2006)
Hauling Distance		-	
Local	miles	100	-
Hauling Emissions			
Fuel Efficiency	miles per gallon	8	
CO_2	kg CO_2/gal diesel	10.2	CA Climate Action Registry Reporting Tool
N_2O	kg N_2O/gal diesel	0.0001	CA Climate Action Registry Reporting Tool
CH_4	kg CH_4/gal diesel	0.003	CA Climate Action Registry Reporting Tool
Sum Hauling Fuel	kg CO_2/gal diesel	10.2	CA Climate Action Registry Reporting Tool

GWh = Giga Watt Hours
MWh = Mega Watt Hours
MMBTU = Million British Thermal Units
BTU = British Thermal Unit
PE = Population Equivalents
kBTU/sf/yr = 1,000 British Thermal Units per Square Foot per Year
cf = cubic feet
lb = pound
kg = kilogram
gal = gallon

Risk Comparison



Compounded Conservatism

Everyone has <u>all</u> of the following characteristics:

Parameter	National Default Value	Proposal for Washington	Proposal for Maine (Indian Lands)
Weighs…	80kg (176 lbs)	Same	Same
Every Day for 70 Years Drinks Water From the Same Location That is …	•2.4 L/day (2.5 quarts): •Unfiltered and Untreated *<u>and</u>* •From Surface Water (lakes, streams, etc.) *<u>and</u>* •Contaminated at the HHWQC Level	Same	Same
<u>AND</u> Every Day for 70 Years Consumes Fish From the Same Location That Is …	•22 g/day (.8 oz): •From Local Waters, Grocery Stores, Aquaculture, Foreign Countries (excluding marine) *<u>and</u>* •From Waters Contaminated at the HHWQC Level *<u>and</u>* •Fish are Contaminated with Pollutants from the Water to the Maximum Extent Possible	Same Except 175 (.39 lbs)	Same Except 286 (.63 lbs) (a rate unsuppressed by availability or safety concerns)

Policy Issues

Impact of EPA Choosing 10^{-6} v. 10^{-5} v. 10^{-4} Excess Lifetime Cancer Risk Level

"10^{-6} means the "risk of developing cancer…would be one in a million *on top of the background risk* of developing cancer from all other exposures." (emphasis added)*

If Everyone has ALL of the Equation Characteristics:

Background Risk of Developing Cancer	Theoretical Risk with 10^{-4}	Theoretical Risk with 10^{-5}	Theoretical Risk with 10^{-6}
4 in 10, or .40000	.4001	.40001	.400001

* EPA Proposed Criteria for Maine, 81 *Fed. Reg.* 23243 (4/20/16)

American Forest & Paper Association

HDR Report to the NWPPA: *"Increasing the Fish Consumption Rate: Report of Fiscal Impact to Select Northwest Pulp & Paper Mills"*

HDR Engineering, Inc.
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EXECUTIVE SUMMARY

The Oregon Department of Environmental Quality (ODEQ), United States Environmental Protection Agency (EPA) and Confederated Tribes of the Umatilla Indian Reservation (CTUIR) are planning to make human health water quality criteria (HHWQC) more stringent. This change is due to indications by CTUIR that some of its members consume fish at a greater fish consumption rate (FCR) than the FCR that HHWQC are currently based on. If the FCR used for establishing HHWQC is increased, HHWQC will correspondingly become more stringent.

The initiative to determine the need and justification for the more stringent WQC is referred to as the Oregon Fish and Shellfish Consumption Rate Project and was started by ODEQ, EPA and CTUIR. As part of the project, the ODEQ commissioned Science Applications International Corporation (SAIC) to prepare a report evaluating necessary actions and costs to meet more stringent WQC. SAIC completed this report in January 2008 and it is named *Cost of Compliance with Water Quality Criteria for Toxic Pollutants for Oregon Waters*. It is the opinion of several point source dischargers that the SAIC report did not fully capture costs associated with achieving statewide compliance with revised HHWQC and the costs presented were significantly underestimated. In addition, the report did not sufficiently address the ability of currently available technology to meet the new HHWQC particularly when the HHWQC is below analytical method detection limits.

The purpose of this study and report is to verify the HHWQC that must be met, determine if proposed technologies will meet the limits, and develop an opinion of probable cost for implementing and operating these technologies. Since several of the proposed technologies have not been tested or advanced beyond bench-scale testing, there is much uncertainty in the full-scale applicability of some of the technologies. Therefore, bench testing, pilot-plant testing and/or full-scale demonstrations would be needed to verify with greater accuracy the actual achievable effluent quality for these technologies.

This report develops an opinion of fiscal impacts to the Oregon pulp and paper industry due to more stringent HHWQC from increased FCR. The following report methodology was used to determine these impacts:

1. Collection and review of treated wastewater effluent data from four different pulp and paper mills.
2. Determination of current HHWQC and potentially more stringent HHWQC due to increased FCR; these criteria were then compared with mill final effluent data.

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3. A list of candidate treatment technologies was developed for removing these constituents by reviewing studies pertinent to the Fish Consumption Project. Additional literature was reviewed as well to determine other potential treatment technologies.
4. Treatment technologies were screened for reliability and feasibility in meeting applicable HHWQC.
5. Capital and operational cost opinions were developed for the screened treatment alternatives.

Four representative mills were evaluated for this report and are summarized below. :

Mill A – Bleached Kraft Process
Mill B – Unbleached Kraft Process
Mill C – Thermomechanical Pulping/Deink Process
Mill D – Bleached Kraft Process

Data from the four mills was compiled, averaged and compared to HHWQC at increased FCRs. HHWQC at increased FCRs were calculated with the aid of a computer model spreadsheet developed by the ODEQ. The spreadsheet utilizes epidemiological data including reference doses, bioconcentration factors, carcinogen slope factors and other parameters to determine WQC for a given FCR, water intake and body weight.

The model was run at three different FCRs including 17.5 g/day, 63.2 g/day, 113 g/day and 175 g/day. Current WQC is based on a FCR of 17.5 g/day. Changes to WQC by ODEQ could be based on a FCR as high as 175 g/day. The spreadsheet model shows that current mill effluent quality may exceed some of the HHWQC at the elevated FCRs.

It is critical noting that the lowest method detection limit (MDL) for all EPA-approved analytical methods is greater than the new HHWQC for some constituents. While this report identifies potential technologies for removing these constituents, it is impossible to know for certain whether technologies actually can or cannot meet HHWQC since there is no way to accurately measure at such low concentrations at this time. Despite the inability to measure accurately to the HHWQC, it is expected that point source dischargers would still need to plan to meet HHWQC since more sensitive analytical methods could become available. Furthermore, regulating authorities would expect point source dischargers to meet WQC whether or not analytical methods could accurately detect below the WQC.

HHWQC limits at increased FCRs are extremely stringent compared to other environmental standards. HHWQC at increased FCRs should be scrutinized to compare the value of improving water quality with to the actual protection to human health. For example, revised HHWQC at increased FCRs are multiple orders of magnitude more protective than national drinking water standards. Another comparison of note is background water quality. A review of current water quality shows that many of the revised HHWQC may already be exceeded in Oregon surface waters. Therefore, the

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opportunity for applying pass-through credits to point source dischargers should be considered where background constituent levels are high.

A literature review of treatment technologies was completed to determine which, if any, technologies can reliably meet the revised HHWQC at higher FCRs. The literature review showed that most published results for constituent removal are related to higher untreated constituent concentrations and technologies for achieving less stringent effluent criteria. These less stringent effluent criteria (including drinking water standards) are orders of magnitude greater than HHWQC for this study. As a result, little research has been conducted investigating constituent removal technologies to extremely low levels. Therefore, published literature does not support or deny that more stringent HHWQC can be met using currently available technologies. Technologies suggested for meeting low level constituents (mostly for metals) included iron coprecipitation, granular activated carbon, ion exchange, nanofiltration and reverse osmosis. Further evaluation of the technologies showed that iron coprecipitation, nanofiltration and reverse osmosis would have the best possibility of meeting HHWQC at increased FCRs and were then evaluated for cost.

Capital and O&M cost opinions for the four mills were evaluated for the three candidate technologies. The costs are summarized below.

Summary of Capital, O&M and Annualized Costs

		Mill A	Mill B	Mill C	Mill D
Capital Costs	Iron Coprecipitation	$31,000,000	$25,000,000	$19,000,000	$34,000,000
	Nanofiltration	$91,000,000	$67,000,000	$41,000,000	$101,000,000
	Reverse Osmosis	$107,000,000	$79,000,000	$48,000,000	$119,000,000
Annual O&M Cost	Iron Coprecipitation	$28,000,000	$20,000,000	$11,000,000	$31,000,000
	Nanofiltration	$9,500,000	$6,700,000	$3,900,000	$10,500,000
	Reverse Osmosis	$10,500,000	$7,400,000	$4,300,000	$11,700,000
Annualized Costs (10 yrs, 7%)	Iron Coprecipitation	$32,000,000	$24,000,000	$14,000,000	$36,000,000
	Nanofiltration	$22,000,000	$16,000,000	$10,000,000	$25,000,000
	Reverse Osmosis	$26,000,000	$19,000,000	$11,000,000	$29,000,000

Cost provided above represent only four of the eight large mills located in Oregon. The cost related to simply installing technology to meet revised HHWQC at increased FCRs is significant and would cost the Oregon pulp and paper industry in excess of $500 million. In addition, annual costs to operate these technologies would cost Oregon pulp and paper mills in the range of $30 to $90 million annually. While costs are significant, there is no certainty at this time that revised HHWQC could be met using existing technology. Steps forward should first ensure that technologies are available for meeting more stringent HHWQC before significant capital expenditures are made.

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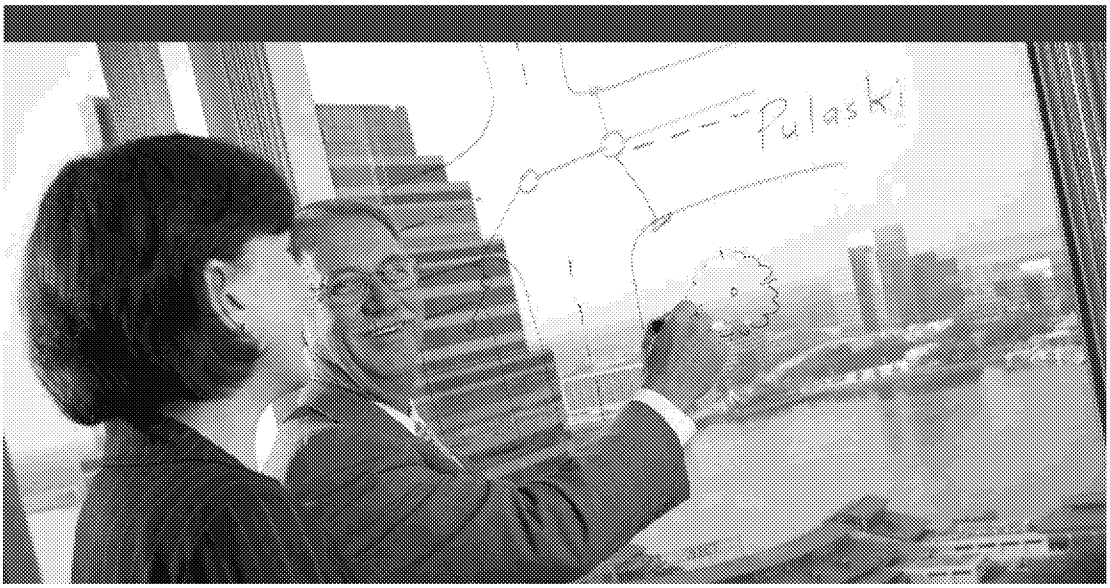

Source: Scott Dobry Pictures

Business Indicators

- Ranked No. 19 among *Engineering News-Record*'s 2007 "Top 500 Design Firms"
- Projects in all 50 states and in 60 countries
- More than 90 years of client service

HDR is an architectural, engineering, planning and consulting firm that excels at helping clients manage complex projects and make sound decisions.

As an integrated firm, HDR provides a total spectrum of services for our clients. Our staff of professionals represents hundreds of disciplines and partner on blended teams nationwide to provide solutions beyond the scope of traditional A/E/C firms.

HDR's operating philosophy is to be an expertise-driven national firm that delivers tailored solutions through a strong local presence. HDR's ability to draw upon companywide resources and expertise is a great strength in meeting and exceeding your expectations.

History and Size

- Founded in 1917
- More than 7,500 employee-owners
- More than 165 locations worldwide
- Full-service, multidisciplinary staff

Service Areas

HDR provides solutions that help clients manage complex projects in the following areas:

- Civic
- Community Planning & Urban Design
- Construction Services
- Design-Build
- Economics & Finance
- Environmental
- Healthcare
- Interior Design
- Management & Planning Services
- Power & Energy
- Program Management
- Project Development
- Science & Technology
- Security
- Sustainable Design
- Transportation
- Water/Wastewater

FOR IMMEDIATE RELEASE

December 5, 2013

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Study: Technology not available to meet proposed water quality standards

Municipal ratepayers, consumers to face significant costs for standards that can't be met

OLYMPIA — Even the most advanced technology available today cannot meet limits driven by the state's proposed water quality standards — and would potentially cost billions with little or no benefit to the environment.

Those are the key findings from a new report issued today by the state's three largest trade associations for businesses, cities and counties.

The report, "Treatment Technology Review and Assessment," was conducted by HDR Engineering, Inc. to assess the cost and effectiveness of advanced treatment technologies to meet these revised limits. The Association of Washington Business (AWB), the Association of Washington Cities (AWC) and the Washington State Association of Counties (WSAC) commissioned the report.

The review was prompted by the state's effort to update its surface water quality standards for toxics, in part based on revised estimates of how much fish people eat (referred to as the "fish consumption rate" or FCR). This affects industrial and municipal dischargers – businesses, cities and counties that discharge into public waters.

One goal of the state Department of Ecology's effort is to provide greater health protections for high fish-consuming populations — a goal shared by employers and local governments around the state.

AWB, AWC and WSAC believe a dramatically more stringent water quality standard, like that recently adopted in Oregon, is literally impossible for affected municipal and industrial facilities to meet. Oregon's standard is considered the most stringent in the nation, the impacts of which

have not yet been felt since no major permits have been issued since the standards were adopted.

HDR's analysis focused on four very difficult-to-treat pollutants expected to be in the effluent of the state's municipal and industrial wastewater treatment facilities: PCBs, mercury, arsenic and benzo(a)pyrene — a commonly encountered hydrocarbon byproduct.

Their findings: Even the most advanced water treatment technologies would not be able to meet standards for the four targeted pollutants. Any businesses or local governments would be in violation of the proposed standard, despite making significant investments in technology that would not work.

HDR's treatment technology review anticipates additional capital, operating and environmental costs (e.g. higher energy usage) as a result of industrial and municipal efforts to meet the proposed standard.

"Cities around the state support Governor Inslee's efforts to find a balanced and practical solution to this issue," said Mike McCarty, CEO of the Association of Washington Cities. "Cities collectively operate hundreds of treatment plants cleaning up hundreds of millions of gallons of wastewater each day. We believe utility ratepayers shouldn't be faced with billions of dollars in investments that still expose them to significant legal liability because standards can't be met. Some cities estimate residential utility bills could increase to as much as $200 a month under this scenario," he said. "Instead, we'd like to find a creative and balanced solution that looks at the sources of the toxics and how to get and keep them out of the water."

HDR's analysis also suggests significant implications for private sector employers and the state's economic climate if the proposed water quality standards are adopted.

"What this study underscores is the need for balance in our conversation about water quality standards. We need clean water and we need to protect human life, but we also need a standard that can be reasonably met with existing technology," said Don Brunell, president of the Association of Washington Business.

"As the study notes, even if our members do make the required investments, they still won't meet the proposed standards. And that just feeds uncertainty – about permitting, about growth and expansion of business and, eventually, about jobs in Washington state," he said.

"New businesses are unlikely to locate here given a standard like this. And existing businesses won't invest in technology that doesn't meet standard. So they'll close up shop and move elsewhere. And that means the potential loss of jobs, particularly in rural areas of Washington state that cannot take another massive industry shut down.

"We have to work together to find a solution that works for everyone. This study confirms the proposed standards will not get us where we need to be," he said. "We have to keep working on a more equitable solution for everyone."

A PDF copy of the HDR study is available here.

About the Association of Washington Business

Formed in 1904, the Association of Washington Business is Washington's oldest and largest statewide business association, and includes more than 8,100 members representing 700,000 employees. AWB serves as both the state's chamber of commerce and the manufacturing and technology association. While its membership includes major employers like Boeing, Microsoft and Weyerhaeuser, 90 percent of AWB members employ fewer than 100 people. More than half of AWB's members employ fewer than 10. For more about AWB, visit www.awb.org.

About the Association of Washington Cities

Founded in 1933, the Association of Washington Cities (AWC) is a private, non-profit, non-partisan corporation that represents Washington's cities and towns before the state legislature, the state executive branch and with regulatory agencies. Membership is voluntary. However, AWC consistently maintains 100% participation from Washington's 281 cities and towns. A 25-member Board of Directors oversees the association's activities.

About the Washington State Association of Counties

Created in 1906, the Washington State Association of Counties (WSAC) is a voluntary, non-profit association serving all of Washington's 39 counties. WSAC members include elected county commissioners, council members and executives from all of Washington's 39 counties. The Association provides a variety of services to its member counties including advocacy, training and workshops, a worker's compensation retrospective rating pool and a forum to network and share best practices. While voting within the organization is limited to county commissioners, council members and county executives, the Association also serves as an umbrella organization for affiliate organizations representing county road engineers, local public health officials, county administrators, emergency managers, county human service administrators, clerks of county boards, and others. In addition, we work closely with our sister organization, the Washington Association of County Officials (WACO), which serves independently elected non-judicial county officials including auditors, treasurers, prosecutors, coroners, clerks, and sheriffs.

-30-

NPDES Water Quality Permitting Program Evaluation

Submitted to:

Oregon Legislative Assembly

By: Richard Whitman, Interim Director

Oregon Department of Environmental Quality

December 2016



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DEQ is a leader in restoring, maintaining and enhancing the quality of Oregon's air, land and water.

DEQ

State of Oregon
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Executive Summary

The 2015 Oregon Legislature directed the Oregon Department of Environmental Quality to hire an outside consultant to evaluate its National Pollutant Discharge Elimination System (NPDES) Water Quality permitting program and make recommendations to improve the quality and timeliness of individual NPDES permits. There are currently 360 individual municipal and industrial NPDES wastewater permits in Oregon, which must be renewed every five years. DEQ administers other water quality permits (general NPDES permits, Water Pollution Control Facility (WPCF) Permits, and water quality certifications), but the permit backlog that motivated this evaluation is concentrated in the individual NPDES permit program.

DEQ contracted with MWH Americas, Inc., now part of Stantec, and its subcontractor Larry Walker Associates to conduct the evaluation. The consultants' work began in April and culminated in December 2016 with the final Recommendations and Implementation Plan. Project information and documents are available on DEQ's website at http://www.deq.state.or.us/wq/wqpermit/review.htm

Through research and interviews with dozens of knowledgeable staff and stakeholders, the consultants identified a number of issues contributing to the NPDES permit backlog, including:

- Lack of clarity regarding decision-making responsibility
- Ambiguity regarding the roles of staff working on permits (technical advisor vs. regulator)
- Lack of coordination between water quality planning and permitting
- The difficulty for some dischargers to meet water quality standards, requiring complex regulatory solutions and/or expensive engineering

The consultants recommended numerous actions and implementation approaches covering a number of different topic areas to address these issues. Topic areas include leadership, community capacity, alignment across programs and with federal regulations, quality and efficiency, staffing and workload, program funding, and communications and progress reporting.

The overarching message in the report is that eliminating the NPDES permit backlog and achieving a sustainable permitting program is dependent on addressing the recommended actions in all topic areas, not all of which are under DEQ's control. If recommended actions are only partially implemented, while some gains may accrue, a sustainable permitting program will not be possible.

DEQ and the Oregon Environmental Quality Commission are committed to implementing the recommendations in the report, and consider this to be a top priority for the agency – one which will likely require years of focused attention to resolve. Internal process improvements are underway and DEQ is engaging external partners and stakeholders to seek their assistance in implementing the report's recommendations.

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The Water Quality program's immediate priorities include developing a longer-term work plan and a communications plan, implementing initial internal organizational changes, and undertaking a "permit readiness review." The readiness review identifies backlogged permits for which there are sufficient water quality data, compliance solutions and community capacity to immediately proceed with permit renewal. The readiness review also identifies barriers to renewing other permits, which provides information to support development of a strategic plan to remedy those barriers. The program will continue writing NPDES permits while implementing the recommendations but during the initial stages permit writers may be called upon to lend their expertise to critical process improvement efforts and updating permit writing tools and templates. DEQ will be able to provide more information on next steps and expected outcomes by late January 2017.

1. Introduction

The 2015 Oregon Legislature, due to concerns with a backlog in renewing individual municipal and industrial NPDES water quality permits, directed DEQ to hire an outside consultant to evaluate the NPDES Water Quality permitting program and make recommendations on improving the quality and timeliness of permits. The full text of the budget note is provided in Appendix A.

The evaluation focuses on the 360 DEQ-issued individual and municipal NPDES permits. These are federal permits authorized by the federal Clean Water Act. Each permit must be renewed every five years. While a permit remains in effect even if its renewal is delayed, there can be negative consequences. Outdated permits may not assure that discharges meet current water quality standards if the standards have been expanded or tightened since the permit was originally issued. Further, a permitted facility may not be able to expand or implement process changes if those actions would require a change to its permit, because DEQ is not able to modify expired permits. In the long term, this uncertainty can lead to disinvestment in existing manufacturing facilities and to significant capital costs to local governments. Finally, expired permits can also hinder economic development. Under certain circumstances, a new facility may not be able to obtain a permit if the permits of other facilities discharging to that waterbody are out of date.

2. Project Plan

In May 2015, DEQ assembled a project team and began procuring a contractor. DEQ requested support from the Department of Administrative Services in developing the Request for Proposal. DEQ met three times with members of the Water Quality program's Blue Ribbon Committee to obtain its feedback on a draft scope of work for the proposal, and made improvements to the scope based on the committee's input.

DEQ selected a contractor in early 2016 through a competitive procurement process. The contract was awarded to MWH Americas, Inc., now part of Stantec, and its subcontractor

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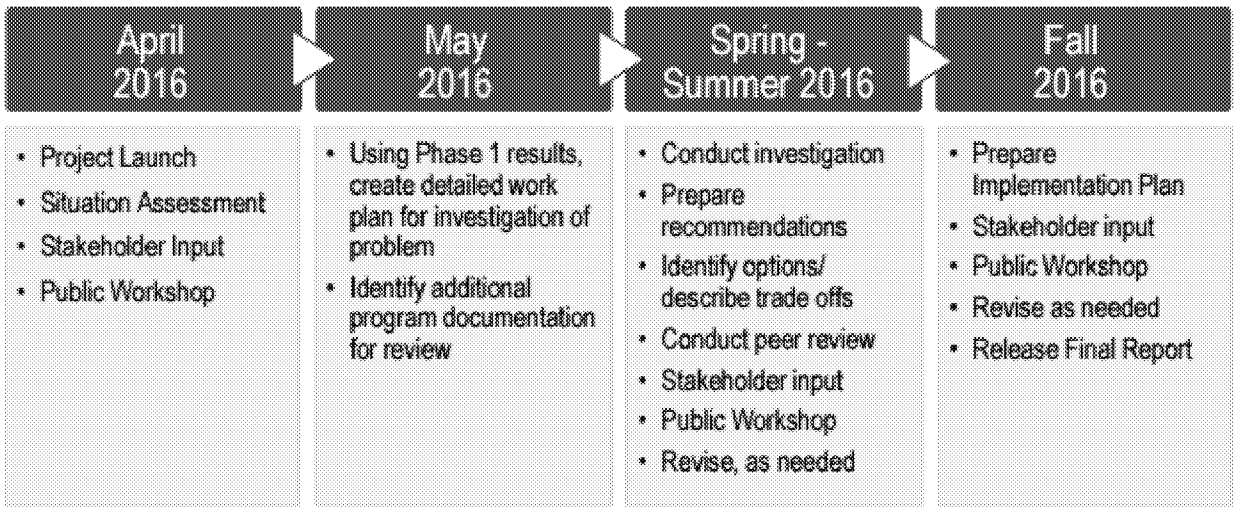

Larry Walker Associates. Work began in April and culminated in December 2016 with the final Recommendations and Implementation Plan.

The project plan involved researching past reports and other permitting program documents, interviewing dozens of knowledgeable staff and stakeholders, holding three public workshops to report findings and receive feedback on draft recommendations, and expert peer review of draft recommendations.

3. Recommended Actions

DEQ received the Recommendations and Implementation Plan on Dec. 8, 2016. It contains recommended actions and implementation approaches covering a number of different topic areas. The report is available at http://www.deq.state.or.us/wq/wqpermit/review.htm

The report's overarching message is that eliminating the permit backlog and achieving a sustainable level of NPDES permitting is dependent on widespread changes at the systems level. If recommended actions are only partially implemented, the backlog problem that has persisted already for over fifteen years is unlikely to diminish measurably and Oregon's NPDES permitting program will fail to achieve a sustainable level of operation.

A high-level overview of the final report including excerpts of the consultants' key findings and recommended actions is provided below.

Leadership

The lack of clear decision authority, the decentralized structure of DEQ and the distribution of water quality personnel across several organizational entities inhibits the ability of the organization to overcome its permit backlog.

Recommended Actions

- Elevate permit renewal to a top priority of the Water Quality program, and centralize authority for permit issuance.

- Update individual and organizational performance metrics to emphasize the elevated importance of permit renewals.

- Sunset the Blue Ribbon Committee and convene one or more new advisory bodies for the program that has a well-defined role in helping to implement the report's recommendations.

Community Capacity

Some of Oregon's communities lack the technical and/or financial resources to comply with their NPDES permits. This contributes to the permit backlog in two ways. In some instances, DEQ permit writers have provided technical support to permit holders that extends beyond their core permit-writing responsibilities. This reduces the amount of time devoted to permit renewal. DEQ has also been reluctant to issue permits at times due to concerns about a community's ability to afford or carry out required facility upgrades.

Key Actions

- Develop an inventory of permitted facilities that includes information on their ability to comply with existing and anticipated future permit requirements.

- Estimate additional resources needed to build treatment facilities or natural systems to achieve compliance.

- Convene an advisory group to identify and develop strategies to assist individual municipal and industrial NPDES permit holders with both the technical expertise needed to develop, design and operate wastewater facilities, and the financial assistance necessary to pay for facility upgrades, expansions or other changes. The advisory group should include representation from the Legislature, as it is likely that legislative action will be required for the program to succeed in the long term.

Alignment Across Programs and with Federal Requirements

NPDES permits must comply with federal requirements including but not limited to implementation of water quality standards and Total Maximum Daily Load (TMDL) requirements in permits. DEQ has not always integrated its work in water quality standards and TMDLs with its NPDES permit program, to assure that standards and TMDLs can be readily implemented in permits. Draft permits have not consistently aligned with these requirements and sometimes require rework, adding to time it takes to issue or renew a permit.

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Key Actions

- Work with stakeholders to identify effective strategies and procedures to implement water quality standards and TMDLs in permits, including strategic use of permitting tools such as site-specific standards, multiple discharger variances and trading programs.

- Evaluate DEQ's process for developing water quality standards. Develop methods to address cases where it has been problematic to attain beneficial uses and water quality standards associated with those uses.

Quality and Efficiency

A series of process improvements are needed to improve and ensure consistent permit quality and address significant inefficiencies in the NPDES permit renewal process.

Key Actions – Data Management

- Execute a plan to efficiently gather and deliver data that is routinely needed as part of the permitting process.

- Establish electronic reporting systems, and consult with the regulated community to develop a process for accepting monitoring data electronically, in a manner that makes it easily accessible to permit writers.

Key Actions – Process Improvement

- Review and update permit renewal process maps to remedy inefficiencies and roadblocks.

- Formalize the updated procedures and train staff in their use. Verify that standardized procedures are consistently used.

Key Actions – Permit Tools and Guidance

- Develop a comprehensive permit writer's guidance manual and training program.

- Implement the training program. Conduct post-permit issuance reviews to determine effectiveness of tools and training, and update tools or retrain staff as needed.

- Update and improve user-friendliness of permit templates and tools. Implement processes to ensure they are kept up-to-date with changing policies, water quality standards and legal decisions.

Staffing and Workload

Differences in the level of skills and expertise among permitting staff contributes to inefficiencies and inconsistent permit quality. Given Oregon's current need to reduce backlogs and increase the average number of annual permit renewals, additional short-term resources will be essential to address the backlog. DEQ must also develop the data necessary to provide information needed to support long-term resource planning.

Key Actions

- Implement the following measures to achieve an immediate short-term infusion of additional staff resources. Some may require may require additional program funding or create deficits in other program areas if existing staff are reassigned to do permit-related work.
    - Realign work tasks so that permit writing specialists focus only on permit renewals, and not on technical assistance or enforcement.
    - Secure contractors and/or reassign staff to accomplish high-priority tasks, including moving resources as needed within and between regions to achieve permit issuance objectives.
    - Add temporary staff to supplement the pool of permit writers.
- Collect and utilize data on the amount of time it takes to complete permitting tasks to determine the staffing level needed to eliminate the permit backlog and meet state and federal requirements over the long term.

Program Funding

Circumstances outside of DEQ's control drive the budget process. When permit renewals are delayed due to inadequate program resources, the delay increases the ultimate cost of permit renewal due to inefficiencies and data problems. Funding uncertainty and fluctuations may also impede DEQ's ability to develop and implement effective permit renewal plans.

Key Actions

- Develop a per-permit funding formula for renewals.
- Establish a realistic annual funding estimate based on a five-year work plan. Initial iterations must consider routine and backlogged workload.
- Establish a process for flagging and addressing annual funding gaps.

Communications and Progress Reporting

Tracking and reporting progress is essential to ensure staff and stakeholders are informed, involved and committed to success. Early reporting measures should focus on progress

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toward implementing short-term changes necessary to improve efficiency and quality control. Course corrections and schedule adjustments are inevitable due to the high number of variables. It will be critical to promptly communicate these to internal and external stakeholders.

Key Actions

- Develop and resource a Permit Backlog Reduction Communications Plan.

- Create metrics and institute reporting methods to track implementation progress. Ensure sufficient measures to allow for plan or schedule adjustments if needed.

4. Implementing the Recommendations

Now that the evaluation has been completed and the recommendations are in hand, DEQ is turning its attention to implementation. DEQ and the Environmental Quality Commission are committed to implementing the recommendations in the report and consider this to a top priority for the agency – one that will likely require years of focused attention to resolve. Internal process improvements are underway and DEQ is engaging external partners and stakeholders to seek their assistance in implementing the report's recommendations.

The Water Quality program's immediate priorities include developing a longer-term work plan and a communications plan, implementing initial internal organizational changes, and undertaking a "permit readiness review." The readiness review identifies backlogged permits for which there are sufficient water quality data, compliance solutions and community capacity to immediately proceed with permit renewal. The readiness review also identifies barriers to renewing other permits, which provides information to support development of a strategic plan to remedy those barriers. The program will continue writing NPDES permits while implementing the recommendations but during the initial stages permit writers may be called upon to lend their expertise to critical process improvement efforts and updating permit writing tools and templates. DEQ will be able to provide more information on next steps and expected outcomes by late January 2017.

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Appendix 1 – Water Quality Permitting Budget Note

2015 Legislative Session, Joint Committee on Ways and Means, Subcommittee on Natural Resources

Budget Note:

Water Quality Permitting

The Subcommittee expressed concerns with the backlog in renewing water quality permits and directed the Department of Environmental Quality (DEQ) to undertake a review of its permitting program. To achieve this, the Department is directed to hire an outside consultant with the knowledge and skills needed to conduct an evaluation of the program and the ability to make recommendations. These recommendations will focus on improving the quality and timeliness of water quality permits issued under the NPDES program and meeting the associated metrics developed by the Blue Ribbon Committee in its 2004 report (percent of permits being current, inspections, DMR reviews and assignment of general permit coverage) or any agreed upon replacement metrics. DEQ will report to the appropriate legislative committee on or before December 2015 and again by December 2016 on progress toward completing the evaluation, meeting the program metrics and implementing recommendations that come out of the consulting work. DEQ will work with the Blue Ribbon Committee on implementing these recommendations for meeting programs goals and will provide the Blue Ribbon Committee with periodic updates on progress being made to improve the program.

Message

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Sent: 7/1/2018 1:30:37 PM
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CC: Brent Fewell [brent.fewell@earthandwatergroup.com]

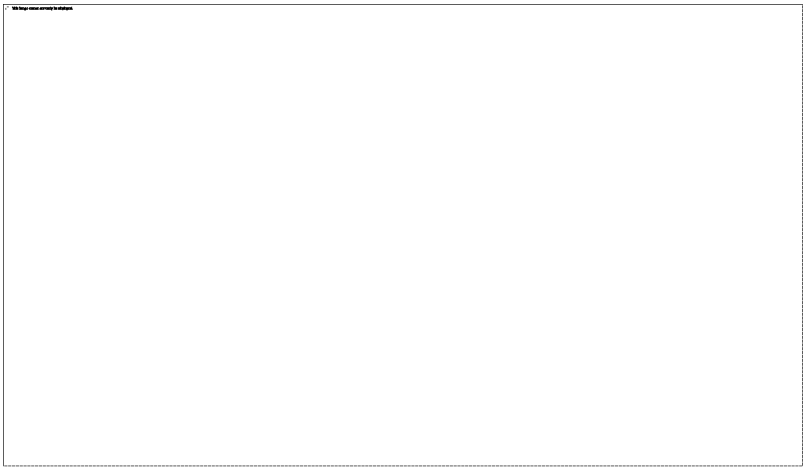
Subject: Sabin Op-Ed - Republicans must return to their conservation roots

Attachments: ATT00001.txt

https://www.washingtonexaminer.com/opinion/op-eds/republicans-must-return-to-their-conservation-roots

Republicans must return to their conservation roots

by Andy Sabin
| July 01, 2018 08:20 AM



Environmental protection is a great American success story.
(AP Photo/Anna Johnson)

Ads by Revcontent

The nation's economy is humming along nicely with unemployment at an all-time low. Now President Trump and Congress must unite for a clean and healthy environment, and Republicans must reclaim leadership on this critical issue.

Republicans have rightfully opposed misguided policies such as President Obama's Clean Power Plan and the Waters of the United States rule. But for far too long, we have done little to proactively shape policy solutions, leaving a vacuum that liberal interest groups have filled with big-government solutions.

It's high time the party of Teddy Roosevelt reclaims the environment, redefines the narrative, and leverages good old-fashioned American know-how and innovation. As Roosevelt once said, "Conservation is a great moral issue, for it involves the patriotic duty of insuring the safety and continuance of the nation."

Environmental protection is a great American success story. The quality of our environment affects every aspect of our economy, health, and quality of life. Thanks, in large measure, to conservative leaders, including Richard Nixon, who established the U.S. Environmental Protection Agency and signed into law the federal clean air and water acts, we are a healthier and more prosperous nation.

We can afford a clean environment because of a robust economy. Moreover, our energy companies, increasingly focused on cleaner energy, are poised to lead the world, creating even more American jobs.

Yet despite our environmental gains over the last 45 years, we still have a long way to go.

Environmental pollution continues to harm America's working families and communities. For example, air pollution alone causes 200,000 early deaths each year in the U.S. Children and those living in socioeconomically distressed communities continue to be disproportionately harmed by air and water pollution. Consider the tragedy in Flint, Mich., where 100,000 people were unwittingly poisoned by lead in their drinking water. As well, many of our nation's water bodies such as the Chesapeake Bay, the Great Lakes, and Gulf of Mexico continue to be impaired due to excess pollution, imposing enormous costs on communities, businesses, and the public health. And there are over 1,300 endangered or threatened species in the U.S listed under the Endangered Species Act and hundreds more are awaiting review.

While many, including myself, applaud the president's decisive actions to reform federal agencies and roll back bad regulations, a caution is in order. We can't afford to gut national safeguards to protect public health and the environment. The American public cares deeply about clean air, clean water, and our public lands.

To be great again means that our air and water are safe and clean, our streams and lakes are swimmable and fishable, our oceans are free from toxic plastic pollution, our public lands are properly maintained and accessible to all, and our natural resources are managed according to the best available science.

My party must return to its conservation roots. It is our moral and patriotic duty.

We can start to by passing important bipartisan legislation. The first, sponsored by Sens. Richard Burr, R-N.C., and Maria Cantwell, D-Wash., would permanently authorize the Land and Water Conservation Fund, one of the

most important programs for protecting federal public lands and waters, including national parks, forests, and wildlife refuges.

Another bill, the WILD (Wildlife Innovation and Longevity Driver) Act, co-sponsored by Sens. John Barrasso, R-Wyo., and Tom Carper, D-Del., would promote wildlife conservation, fight against invasive species, and protect threatened species using U.S. technology and innovation. The National Park Restoration Act, sponsored by Sen. Lamar Alexander, R-Tenn., would help reduce the growing maintenance backlog that has long plagued our national parks. And lastly, the Recovering America's Wildlife Act, sponsored by Rep. Jeff Fortenberry, R-Neb., would help proactively protect species from endangerment and being placed on the ESA list.

America is at its best when we recognize and attack common challenges. Let's put aside partisan politics and make our great outdoors great again.

Andy Sabin, a lifelong Republican, is the Chairman and President of Sabin Metal Corporation and founder of the Andrew Sabin Family Foundation, which funds global research and conservation to protect imperiled species and their habitat, environmental scholarships, and cancer research.

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Message

From: Roger Claff [Claff@api.org]
Sent: 6/8/2018 8:03:01 PM
To: Damico, Brian [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=5293065367ab48c2bb2ebadcf992c0d6-BDamico]
CC: Wood, Robert [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b2676c137cf54db0a5d98df232901821-Wood, Robert]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Ross, David P [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=119cd8b52dd14305a84863124ad6d8a6-Ross, David]; Jeff Gunnulfsen [JGunnulfsen@afpm.org]
Subject: API/AFPM Detailed Comments on Refining ELGs Detailed Study and Refinery Self-Monitoring Program
Attachments: ATT00001.txt; RefiningEffluentGuidelinesLetter.pdf

Importance: High

Brian,

Please find attached our detailed comments on the refining effluent guidelines detailed study, and in particular on the refinery self-monitoring program. As we have discussed, API/AFPM believe refining ELG revisions are not warranted. Should EPA continue the detailed study, the refining self-monitoring program should be narrowly tailored to fill in data gaps, and we maintain naphthenic acids and alkylated PAHs should be removed from the detailed study.

We appreciate the on-going dialogue and cooperative relationship that has been forged on the detailed study. As suggested in the letter, we think perhaps a face-to-face meeting to discuss the attached would be a reasonable next step. Once you have had a chance to review the attached, please contact us to arrange such a meeting. We look forward to continuing the discussion with you.

Thanks!

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June 8, 2018

Mr. Brian d'Amico
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Office of Science and Technology
Office of Water
United States Environmental Protection Agency
Mail Code 4303 T
1200 Pennsylvania Avenue Northwest
Washington, DC 20460

Dear Mr. D'Amico:

On behalf of our members, the American Petroleum Institute (API) and American Fuel and Petrochemical Manufacturers (AFPM) are providing the following update and comments concerning the Environmental Protection Agency's (EPA's) on-going Detailed Study of effluent limitation guidelines (ELGs) for the petroleum refining point source category. API is a nationwide, non-profit, trade association that represents over 625 members engaged in all aspects of the petroleum and natural gas industry, including exploration, production, refining, and distribution of petroleum products. AFPM is a national trade association representing nearly 400 companies that encompass virtually all U.S. refiners and petrochemical manufacturers. AFPM members operate 120 U.S. refineries comprising more than 95 percent of U.S. refining capacity. API and AFPM members are subject to effluent limitation guidelines, including those in the petroleum refining point source category, and so are directly affected by all aspects of the on-going Detailed Study.

We appreciate the cooperative and trusted relationship cultivated over the last several years we have worked together on the Detailed Study. As we have discussed on multiple occasions, API and AFPM members have invested heavily in wastewater treatment technologies where warranted for addressing local water quality concerns. API and AFPM believe EPA has sufficient data, including discharge monitoring reports, toxic release inventories, site visit reports, and the 308 Questionnaire responses, to determine that the existing effluent limitation guideline technology-based limits (TBELs), taken in combination with water-quality-based effluent limits (WQBELs), are protective of human health and the environment, and that revisions to existing petroleum refining TBELs are not warranted. We request EPA analyze the aforementioned discharge monitoring reports, toxic release inventories, site visit reports, and the 308 questionnaire responses, to inform whether it is necessary to proceed with the refinery self-

monitoring program. We believe EPA upon doing so will agree that the data support the conclusion that ELG revisions are not warranted.

If EPA determines the refinery self-monitoring program is justified, EPA should narrowly tailor the program to filling gaps in the available data. Also, EPA should remove naphthenic acids (NAs) and alkylated polynuclear aromatic hydrocarbons (alkylated-PAHs) from the scope of the sampling phase. While we have yet to receive EPA's preliminary analysis, we do appreciate the responsive nature by which EPA shared documentation for the analytical method(s) for alkylated-PAHs and NAs. That said, after thorough and critical review of the documentation by leading industry experts, our members' concerns (detailed in Attachment A) are not resolved. API and AFPM membership strongly oppose inclusion in the Detailed Study of the proprietary analytical method for naphthenic acids and the non-promulgated method for alkylated-PAHs. Data derived from these methods could result in the EPA facing substantial scientific and legal challenge.

Moreover, EPA's use of the proprietary method for naphthenic acids is in clear contradiction to EPA's recent proposed rule to strengthen transparency in regulatory science (83 Fed. Reg. 18768, April 30, 2018, "Strengthening Transparency in Regulatory Science"). The summary of EPA's proposed rule states, "The proposed regulation provides that when EPA develops regulations, including regulations for which the public is likely to bear the cost of compliance, with regard to those scientific studies that are pivotal to the action being taken, EPA should ensure that the data underlying those are publicly available in a manner sufficient for independent validation." Independent validation is clearly not possible when a proprietary analytical method is used to generate the data. In the interest of transparency, per its own proposed rule, EPA should abandon the use of this proprietary method in the Detailed Study.

API's and AFPM's remaining concerns are summarized as follows:

A. Analysis of collected data

EPA has yet to share preliminary analysis of existing data, including discharge monitoring reports, toxic release inventories, site visits, and the 308 Questionnaire responses. Sharing the analysis will clarify the necessity and scope of the sampling phase as well as attain early scientific concurrence with stakeholders. Analysis of existing data should be complete before EPA moves forward with additional data collection through the self-monitoring program.

B. Method not proved in analysis of refinery wastewaters

The method developed by Axys Laboratories, intended for use for analysis of samples in the Study, has never been tested on refinery wastewaters. The documentation provided by EPA suggests that interferences in complex matrices (e.g., refinery wastewaters and effluent), may impact data quality, giving rise to highly variable data, including false positive and/or negative results.

C. Proprietary method impairs validity of data

The proposed analytical method for naphthenic acids is neither an EPA-approved nor an industry-adopted method. In fact, it is Axys Laboratories' proprietary method which directly prevents our members from validating, evaluating or replicating any results. This is a deviation from past EPA procedures and provides neither sufficient transparency nor scientific validity to the Study.

D. Absence of documented environmental benefits

EPA has not identified the environmental concern for including NAs and alkylated-PAHs in the Study. As per the well-established procedures used in past effluent guideline studies, constituents should have an associated toxicity to determine the measurable environmental benefit that may result, if removed. The science and data for the toxicity of NAs and alkylated-PAHs are still a work in progress.

In this regard, we note that of the naphthenic acids and alkylated-PAHs that would be analyzed by the prescribed methods, the vast majority of specific compounds within these mixtures are of a size that could not cross biological membranes to cause toxicity. Typically, compounds with log octanol:water partition coefficients exceeding 6.4 are excluded from toxicity assessments by the target lipid model approach. Quantifying these analytes within "total NAs" or "total alkylated-PAHs" introduces error/bias.

EPA should make available API/AFPM for our review any petroleum refinery toxicity identification evaluation (TIE) data demonstrating naphthenic acid and/or alkylated-PAH toxicity constituting the basis for inclusion of these broad classes of analytes within the Detailed Study.

API and AFPM members believe in due diligence and support EPA in developing sound science. We therefore strongly recommend that EPA remove naphthenic acids and alkylated-PAHs from the Detailed Study. Rather, we recommend that these constituents and their analytical methods be addressed in a project outside of the Study, in which the industry will be a willing participant. A separate project would also allow EPA to follow the appropriate public notice and comment period required to gain method approval. API and AFPM will be happy to discuss the concerns and suggestions in a face-to-face meeting and come to an agreement that addresses the need for validated, reproducible science in support of environmental goals.

In summary, API/AFPM believe refining ELG revisions are not warranted. If EPA continues the Detailed Study, EPA should narrowly tailor the refinery self-monitoring program to filling gaps in the available data. And API/AFPM strongly recommend EPA remove naphthenic acids and alkylated PAHs from the Detailed Study. API/AFPM would participate with EPA in a project outside the Detailed Study to address analytical methods for naphthenic acids and alkylated PAHs.

If you have any questions about these concerns or would like to arrange a face-to-face meeting, please feel free to contact us.

Sincerely,

Roger E. Claff
Senior Scientific Advisor, API

Jeff Gunnulfsen
Director, Security and Risk Management Issues, AFPM

Attachment

cc: R. Wood, EPA
D. Ross, EPA
L. Forsgren, EPA

Attachment A - Report to API and AFPM on Issues with the EPA Proposed Analytical Methods for Groups of Naphthenic Acids and alkylated-PAHs, and the Potential Impact on an ELG Investigation

Introduction

The American Petroleum Institute and American Fuel and Petrochemical Manufacturers (API/AFPM) received a number of documents from the U.S. Environmental Protection Agency (EPA) concerning experimental methods used by AXYS Laboratories for the analysis of naphthenic acids (NAs) and alkylated polynuclear aromatic hydrocarbons (PAHs). Two documents were brief method summaries of the laboratory's analytical procedures. Also included in these documents were Inter-laboratory studies involving these two analytical methods. API/AFPM has examined these documents in considerable detail, and has a number of concerns about these methods, as described in the following report. Our overall conclusions are that these methods are currently highly experimental and should not be used to evaluate refinery wastewater or develop wastewater regulations for the refinery industry.

I. Summary of Issues

1. The AXYS method for naphthenic acids is proprietary to AXYS. As such, EPA did not and could not provide the method procedures for review and comment. EPA intends to require use of the AXYS naphthenic acids method in the petroleum refining detailed study refinery self-monitoring program, notwithstanding the method is proprietary to AXYS. This intention is in clear contradiction to EPA's recent proposed rule to strengthen transparency in regulatory science (83 Fed. Reg. 18768, April 30, 2018, "Strengthening Transparency in Regulatory Science). The summary of EPA's proposed rule states, "The proposed regulation provides that when EPA develops regulations, including regulations for which the public is likely to bear the cost of compliance, with regard to those scientific studies that are pivotal to the action being taken, EPA should ensure that the data underlying those are publicly available in a manner sufficient for independent validation." Independent validation is clearly not possible when a proprietary analytical method is used to generate the data. If EPA seeks transparency, per its own proposed rule, EPA will abandon the use of this proprietary method in the petroleum refining detailed study.

2. The exact definitions of compounds to be included in both the naphthenic acid compound and alkylated PAH compound groups are still not decided, and the analytical lists for each vary widely. In the Environment Canada Inter-laboratory Study on Alkylated PAHs, part of the conclusion states: "This first assessment of the current state of the PAH and alkyl-PAH analysis of environmental samples was rather ambitious. Over 100 separate measurands were asked to be reported in 3 separate matrices. Future studies will focus on a target list more closely approximating the one found in ASTM D7363-11." They also stated they should focus on one matrix per study. This is a concession that the analytical method is unwieldly and matrix

effects are poorly understood, and the reported quantitative results for many of the PAH homologs were extremely poor.

3. For the NAs, Environment Canada is promoting the concept that aromatic naphthenic acids should be included in the "total naphthenic acids" analytical categories. The aromatic NAs are not currently included in the category, and API/AFPM strongly opposes their inclusion. If they were included with other NAs, this would imply that the toxicological and physical-chemical properties of aromatic NAs are basically the same as the properties for the NAs with no aromatic rings in their structure, and this comparability is not known or understood at this time. To determine this, a dependable and vetted method must be developed to analyze aromatic NAs as separate entities, so that their properties can be determined. There currently is no EPA peer reviewed and approved method for either the non-aromatic or aromatic NA categories.

4. The summary AXYS Analytical Method for NAs provided by EPA (the version was dated February 15, 2018) is an extremely complex and detailed method that attempts to separate the NAs in aqueous samples into 60 different categories of compounds. API/AFPM has concerns about several specific issues, some of which may have been overlooked in the necessarily abbreviated AXYS summary overview of the method. Some of our concerns and reservations are discussed below. All of these concerns and others are discussed in the full report.

   - The calibration curve for all sixty categories of naphthenic acid compounds is only provided by a single compound: 1-pyrenebutyric acid, which does not even qualify as a naphthenic acid due to the aromatic rings in its side chain. Further, 1-pyrenebutryic acid is used to generate response factors for the quantification of target compounds. Using a single compound to calibrate perhaps a hundred compounds, without evaluation of consideration of the various structural groups, will result in response factors orders of magnitude apart and will generate a highly biased data set.

   - The summary method states that several of the sixty categories either can or do contain some aromatic NAs, particularly in categories where the "z value" equals minus ten or minus twelve. It is unclear if the method can recognize which compounds are aromatic, but it appears the answer may be no, because otherwise they could be subtracted out from the total for each group. It is also unclear whether additional aromatic compounds may be present in some of the other analytical groups but cannot be detected as such by molecular weight.

   - The summary provides no discussion, for example, of the QC controls on the completeness of the derivatization reaction. We are concerned that di- or tri-carboxylic acids might get counted if only one carboxyl group is derivatized, while mono-carboxylic acids might be missed. Conversely, if two or three carboxylic acid groups per molecule do get derivatized, could molecular weight (MW) fragments of an original di- or tri-carboxylic acid be mistaken for some of the mono-carboxylic acids that are the intended analytical target?

- We note that for at least two of the chromatograms depicted on page six, there seems to be significant interfering overlap of some peaks within the same molecular weight. We are concerned that the interference could be many times greater for actual refinery wastewater, and that these interferences might be "double-counted" in any final total result, especially in highly complex wastewater matrices.

5. For naphthenic acids, the two Inter-laboratory Studies provided by EPA from Environment Canada did not provide any comparison of the analyses of different categories of naphthenic acids. The quantitative assessment was limited only to "total naphthenic acids" and included analyses by several different methods. For total NAs, the AXYS laboratory was evaluated with a somewhat high overall recovery for total NA (115-120%), which was typical of the labs using some form of liquid chromatography/mass spectroscopy (LC/MS) method in this study. (We are again concerned whether in more complex wastewater samples, this slight high bias might be much higher.) Given the dates of these studies (2012 and 2016), it is unclear whether the version of the AXYS Method (dated 2/15/18) described in the summary provided by EPA/AXYS was the same version as used for these two earlier studies.

6. Conclusion Number 8 for the 2016 Naphthenic Acid Inter-laboratory Study stated the following: "The complexity of the background matrix needs to be increased further. The synthetic toxicity testing matrix is suitable for method validation purposes but future inter-laboratory studies should use a natural water matrix for all samples." API/AFPM agrees that this is needed, and has stated that actual refinery samples, especially untreated wastewater samples, can greatly complicate the analytical process for many well established methods, let alone experimental procedures currently being developed.

7. EPA provided one Inter-laboratory Study for Alkylated PAHs. Most of the laboratories performed quite well on the traditional single-compound PAHs, with on average about a 22% Relative Target Standard Deviation (RTSD) per compound for aqueous samples. However, the story was entirely different for the alkyl-PAH homolog groups. For aqueous samples, the average RTSD was extremely large at 80%, with some PAH homolog groups being well over 100% RTSD. If the standard data acceptance criterion of plus or minus three standard deviations is applied to this data, it is difficult to describe the analysis of these PAH homologs as being even semi-quantitative. The literature documents errors associated with EPA 8270, resulting in overestimation of alkylated PAH concentrations (Wilton et al. *Analytica Chimica Acta* 977 (2017), pp. 20-27).

8. We are also concerned about how toxic weighting factors (TWF) might be developed and applied to analytical groups or subgroups (such as naphthenic acids or alkylated PAH compounds) that could include hundreds of different compounds. Typically, toxicity testing is performed using pure individual compounds; this assures that during toxicity testing, the

source of any toxicity can be attributed to that specific compound. We are concerned that for large groups of unidentified compounds, any perceived TWF observed during toxicity testing could be due to a very few compounds that are not representative of the overall group or are only present in that group of compounds when analyzed from a specific source. These few compounds may or may not be present in an analytical group from other sources or other types of wastewater. It should be noted that in Conclusion number 6 to the 2016 total Naphthenic Acid Inter-laboratory Study, Environment Canada expressed concern that the commercially available standard, Merichem Naphthenic Acid Solution (used to spike the samples, and presumably a similar mixture might be used for any toxicity testing), did not seem to match the contaminants in wastewater at the Athabasca oil sands region (sample OSPW in the study). By inference, this comment suggests that if the current naphthenic acid standard mixture solutions are not representative of oil sands process-affected water (OSPW), they are unlikely to be representative of other types of water matrices such as treated refinery wastewater either and therefore are inappropriate for determining what constituents might cause toxicity in refinery wastewater.

II. Issues Concerning an Exact and Appropriate Definition of the Compounds Being Analyzed for both Naphthenic Acids and alkyl-PAH Homologs

Based on published scientific literature discussing the analyses of both Alkylated PAHs and Naphthenic Acids, there are significant discrepancies as to exactly what types of compounds are considered appropriate to include into each of these groups. The grouping of compounds varies between different agencies (EPA, Canada, various US states), environmental papers, and also with the laboratories analyzing the samples (even in the inter-laboratory study by Environment Canada). There should be a clear and vetted definition of exactly what is intended to be measured and included within each of these broad analytical groups, and only peer-reviewed and approved methods should be used.

A. Naphthenic Acids: Strict Definition and Potential Issues

The AXYS Laboratory definition of a naphthenic acid is any configuration of fatty acid chain that 1) contains between twelve and twenty-one carbons, 2) that does not contain any aromatic carbon rings, 3) has only a single carboxylic acid group, and 4) is either saturated or has a degree of unsaturation defined by a negative "z" number that can equal the even numbers 0, -2, -4, -6, -8, -10, or -12, with each negative even number progressively corresponding to the loss of two more hydrogen atoms due to double bonds or alkyl carbon rings. The general formula is: $C_nH_{2n+z}O_2$. In common language, this definition and formula includes most naturally occurring fatty acids, and these can be saturated (maximum number of hydrogens: $z = 0$), monounsaturated (missing two hydrogen atoms due to a double-bond or cyclic non-aromatic ring: $z = -2$), or polyunsaturated (multiple double bonds, or more rarely, multiple cyclic, non-aromatic rings: z = higher even negative numbers up to -12). This definition of naphthenic acid (and, perhaps, any definition) is far from universally held, making data comparisons nearly impossible. There are some other

definitions in use (or that have been used) that utilize greater or lesser numbers of carbon atoms, a larger number of carboxylic acid groups, the presence (or absence) of some cyclo-alkane compounds, or different degrees of saturation. This particular definition used by AXYS might be due to the analytical method being used, or to the industrial wastewater being studied, or to certain common chemical properties these acids have in common. However, this definition of naphthenic acids is already very broad and can include hundreds or even thousands of compounds (including isomers).

Most of these fatty acids that meet this strict definition are essential components in vegetable oils, dairy products, animal fats, and also in processed foods such as dehydrogenated or polyunsaturated fats or fatty acids and are unlikely to be toxic. However, there evidently is a movement to broaden the definition of naphthenic acid to include carboxylic acids that contain aromatic rings, and Environment Canada has come out in favor of this. (Aromatic carbon rings are the primary constituents of benzene and PAH compounds.) API/AFPM would oppose such a move, because these compounds, if present in treated refinery wastewater, could possibly have significantly different characteristics from the normal aliphatic NAs that are presumably the main target for the analysis. API/AFPM opposes any such change on the grounds that any toxicity that might be measured could be due almost entirely to the inclusion of these aromatic compounds, which might then be transferred to other aliphatic NAs that have little or no toxicity to humans. (The human toxicity factor, or carcinogenicity, is nearly always the main driver when organic compounds are assigned a high TWF.) API/AFPM believes that the compounds that contain aromatic rings in their side-chains might have significantly different toxicological and physical-chemical properties than the standard defined naphthenic acids. Therefore, if they are found to be present in refinery wastewater, they should be evaluated separately from naphthenic acids. This is discussed in more detail in the portion of this report on the potential assignment of TWFs by EPA to analytical results that represent large groups of related compounds.

B. Alkylated PAHs: Definition has apparently been changed several times in recent years

In just the last few years, there have been numerous papers published discussing alkylated PAHs, and nearly all of the papers are different in assuming which types of compounds are to be included under that label. Many of the compounds discussed clearly do not fit the strict scientific definition of alkylated PAHs, i.e. a group of fused hydrocarbon aromatic rings (usually two to five) with substitutions of alkyl groups (methyl, ethyl, propyl, etc.) at some of the available locations around the fused rings. Some of these additional compounds have perhaps incorrectly been justified for inclusion in the group because they are frequently associated with PAH compounds, such as being common components of coal tar (which is to a large extent made up of PAH compounds). Others have even less justification for inclusion in the group. It appears that EPA is currently favoring the list of analytes that is provided with the AXYS Method (MSU 21C, provided by EPA).

Table 1 is a list of compound categories that are or have been suggested to be included in a list of alkylated PAH compounds that could be analyzed. The top three categories of compounds have been included in the AXYS analytical list, along with the traditional single compound PAHs. Compounds towards the bottom of Table 1 are not currently included in the AXYS list of analytical categories but are discussed in various other papers as possibly being identified as alkylated PAHs. It is unlikely that there is any single laboratory currently analyzing all of the compound/group categories in Table 1, and we believe it unlikely that any laboratory is using a method where all possible combinations within each compound group category are analyzed. Even AXYS and the other participants in the Environment Canada Inter-laboratory study (for alkylated PAHs) did not each perform the analysis on all of the over 100 "measurands" (combined individual compounds and homologous groups) requested by Environment Canada.

Table 1: Compounds/groups that do not meet the strict definitions of "PAH" or "alkylated-PAH"

Compound/Group	Comments
Biphenyl (plus alkyl-substituted Biphenyls)	Not really a PAH, as there are no fused rings. However, it is a common component of coal tar, and is therefore found with PAHs. They are on the AXYS analytical list.
Various alkyl substituted PAHs, also termed "alkyl-PAH Homologs"	While these type compounds do meet the "alkyl-PAH" definition, these are not analyzed as individual compounds, but as compound groupings. Each group can contain dozens of compounds, and there can be any number of different groupings possible. (No single laboratory analyzes for all possible alkyl-PAH groupings.) The AXYS Laboratory Analytical List does include an intermediate number of alkylated PAH groups, more than some laboratories, less than others. API/AFPM does not believe these groups should be included, because the quantitative analysis of the PAH homologs in aqueous samples in the 2015 Environment Canada Inter-laboratory Study was almost a complete failure (as described later in this report).
Dibenzothiophene, (plus alkyl-substituted DBTs)	This is a heterocycle (a sulfur atom in the middle ring), and therefore not a PAH. However, it is considered to be chemically similar to anthracene, and is frequently detected in heavy oil fractions. They are on the AXYS analytical list.
Dibenzofuran, other oxygen heterocycles	These are listed in the paper source below[1], and dibenzofuran is included in the alkyl-PAH listing for several laboratories, but these are not PAHs, since they contain oxygen in at least one of the fused rings. The AXYS list does not include dibenzofuran or any other oxygen heterocyclic compounds.
Nitro-pyrene, other nitro-substituted compounds	Some papers list these, and the Minnesota Pollution Control Board (MPCB) incorporates them into their "extended PAH" list. Nitro-substituted compounds have their own chemistry (explosives). These also can be groups of compounds. These are not included on the AXYS analytical list.

Nitrogen heterocycles such as Carbazole, dibenzocarbazole, dibenzoacridines (including groups of alkyl-substitutions)	Minnesota Pollution Control Board (MPCB) incorporates several of these nitrogen heterocyclic compounds into their "extended PAH" list. However, these all contain nitrogen in at least one of the aromatic rings, which greatly alters the chemistry of these compounds. They are polynuclear and aromatic but are not hydrocarbons. These are not included in the AXYS list.

[1]"Time to Say Goodbye to the 16 EPA PAHs? Toward an Up-to-Date Use of PACs for Environmental Purposes" Jan T. Andersson and Christine Achten (2015)

API/AFPM believes it is impractical to analyze samples for all of the possible combinations of compounds and compound groups in all of the above categories. The result would be hundreds of "measurands" (combined single compounds and homologous groups) where the compound groups could each further represent hundreds of additional compounds.

API/AFPM is also opposed to the analysis of alkyl-PAH homologs and any other groups of PAH-like compounds analyzed as a group, because they are not individual compounds, and the 2015 inter-laboratory study clearly indicates that currently they cannot be quantitatively analyzed. This would also apply to other compound groups that may not have been analyzed in the 2015 Inter-laboratory Study. Also, analogous to the argument for naphthenic acids, any toxicity assigned to a mixed group of alkyl-PAH isomers could be dominated by only one or a few compounds that may have unique features that are grouped with a larger number of compounds that have negligible toxicity. It should be noted that for the "traditional 16" PAH compounds, the assigned TWF ranges from 100 for benzo(a)pyrene to 0.008 for acenaphthylene. That is a TWF range of greater than four orders of magnitude. This problem with grouping alkyl-PAHs is discussed further in the portion of this report on the potential danger of assigning TWFs by EPA to analytical results that represent large groups of related compounds.

API/AFPM is not opposed to the analysis of individual non-PAH compounds if EPA can justify that such compounds can be or are often associated with other PAH compounds with similar physical-chemical and toxicological properties and an appropriate, recognized and vetted analytical method can be employed. We note that the AXYS analytical list already includes the analysis of biphenyl and dibenzothiophene as separate compounds. The individual compounds dibenzofuran and carbazole are already commonly included on many laboratory semi-volatile organic analytical lists and will likely be analyzed as independent compounds anyway. As to the other heterocycles, we think EPA should justify the investigation of those compounds, as some of them seem unlikely to be present and are rarely if ever analyzed by most laboratories.

III. Analytical Methods Used for Naphthenic Acids: Analytical Problems and Inter-laboratory Studies

Currently, all environmental laboratories only analyze naphthenic acids either as total naphthenic acids, or as groups of compounds with the general formula $C_nH_{2n+z}O_2$. There are no calibrations

performed that are utilized to quantitate individual compounds, and the type and number of calibration standards prepared for different compound groups varies by the method and laboratory using them. Naphthenic acids (NA) can be analyzed as a single result reported as "total naphthenic acids" using Fourier-transform Infrared Spectroscopy (FTIR, a type of infrared spectrophotometry). Using LC/MS methods, it may be possible to calibrate and analyze for some individual NA compounds, however each group of NA compounds can contain dozens or even hundreds of specific compounds and isomers, making this a daunting task. Laboratories utilizing an LC/MS method often simply report "total naphthenic acids" as the sum of the NA concentrations measured within each NA subgroup that is analyzed by their method.

A. A Brief Description of the AXYS method for analyzing NAs

The AXYS Method is a very complex and ambitious proprietary method for the measurement of naphthenic acids. EPA provided API/AFPM a short summary of this complicated method suitable for public review (MSU-077C, R01, dated February 15, 2018) that describes in general terms the various steps involved. Due to the very recent date assigned, it is not clear whether this exact version of the method was used in either of the inter-laboratory studies (performed in 2012 and 2016) provided by EPA and discussed later in this report. The general procedure is presented in the following.

Aqueous samples can be extracted in the laboratory, or samples can be collected in the field using up to three Polar Organic Chemical Integrative Sampler (POCIS) sampling disks, (which can be used to concentrate samples if desired). Each extract is derivatized with 1-ethyl-3-(3-dimethylaminopropyl) carbodiimide hydrochloride (EDC), to form the corresponding naphthenic acid-EDC derivatives. This means that there is a reaction with the carboxylic group, so that an acid-EDC complex is generated. This step is presumably performed to enhance the solubility, chromatography, and/or mass spectral pattern of the naphthenic acids. Analysis of the extracts is performed by high performance liquid chromatography (HPLC) with triple quadrupole mass spectrometer detection (LC-MS/MS). A fully detailed analysis report using this method would contain values for 60 different analytical groups of naphthenic acids (an amazing amount).

These 60 groups fit the generic formula $C_nH_{2n+z}O_2$, but are restricted as listed in Table 1 of the provided MSU-077C, R01 document (and reproduced later in this report):

- The number of carbon atoms allowed for this NA analysis are only in the range of C12 through C21.
- The carbon chain should not contain aromatic rings.

- The unsaturation factor "z" for the number of hydrogens can only be zero (saturated fatty acid), or negative even integers -2 (unsaturated), -4, -6, -8, -10, or -12 (these last are polyunsaturated). Not every carbon number includes this complete list of "z" values; this serves to limit the number of NA groups to 60 categories. Each category is capable of containing dozens or sometimes hundreds of compounds meeting the same generic formula for the group.

- The AXYS method analysis is supposed to be limited only to parent ions that originally had a single carboxylic acid group (that is the CO_2H element prior to derivatization).

B. Possible issues with the AXYS method for naphthenic acids

We are concerned about several potential problems when this method is applied to actual refinery wastewater.[1] Some of these problems may be left out of the short summary provided, but others might have a major effect on the interpretation of these results, and how they might be used for development of an effluent limitations guideline (ELG). The following bullets identify these issues. They are arranged roughly in order of concern.

1. The method only uses a single calibration curve to quantitate all 60 of the different analytical categories of naphthenic acids, and the calibration uses only a single compound, 1-pyrenebutyric acid (injected at three concentration levels). This particular compound does not even qualify as a naphthenic acid by the scientific definition of that class of compounds, due to the presence of an aromatic PAH group in the side-chain. This type of representative calibration is to our knowledge never employed when the compound itself is not included among the targeted analytes. The inter-laboratory studies discussed below provide little comfort in this area, since those studies are only evaluated on the total naphthenic acid concentration, and not on the 60 different sub-categories included in this method. For the total NA analysis, the AXYS laboratory performed reasonably well (an overall moderately high bias, as did most of the laboratories using some kind of LC/MS method), but for individual categories, the results might be very high or very low. We do not know how much importance EPA might place on individual naphthenic acid categories that have been measured, but if there are great differences in toxicity for these categories, this could be problematic. We realize there are other QC controls, including a Merichem Refined NA Mix that may give reproducible results, however, it appears that the individual compounds contained in this commercial mix are unknown.

[1] Please do not assume that any of the identified problems are a reflection on AXYS Laboratories, which we know is recognized as one of the premier environmental research laboratories in North America. Our concerns are about an experimental method still under development, its possible weaknesses, and how some of the results of this method might potentially be used in the development of a new refinery ELG by EPA.

Table 2. Reproduction of Table 1 in AXYS Method MLA-077: Molecular weights of NA groups that are analyzed with this method

n (C #)	Z # (hydrogen deficiency)						
	0	-2	-4	-6	-8	-10	-12
12	200	198	196	194		--	--
13	214	212	210	208			--
14	228	226	224	222	220		--
15	242	240	238	236	234	232 *	230 *
16	256	254	252	250	248	246	244 *
17	270	268	266	264	262	260	258 *
18	284	282	280	278	276	274	272
19	298	296	294	292	290	288	286
20		310	308	306	304	302	300
21		324	322	320	318	316	314

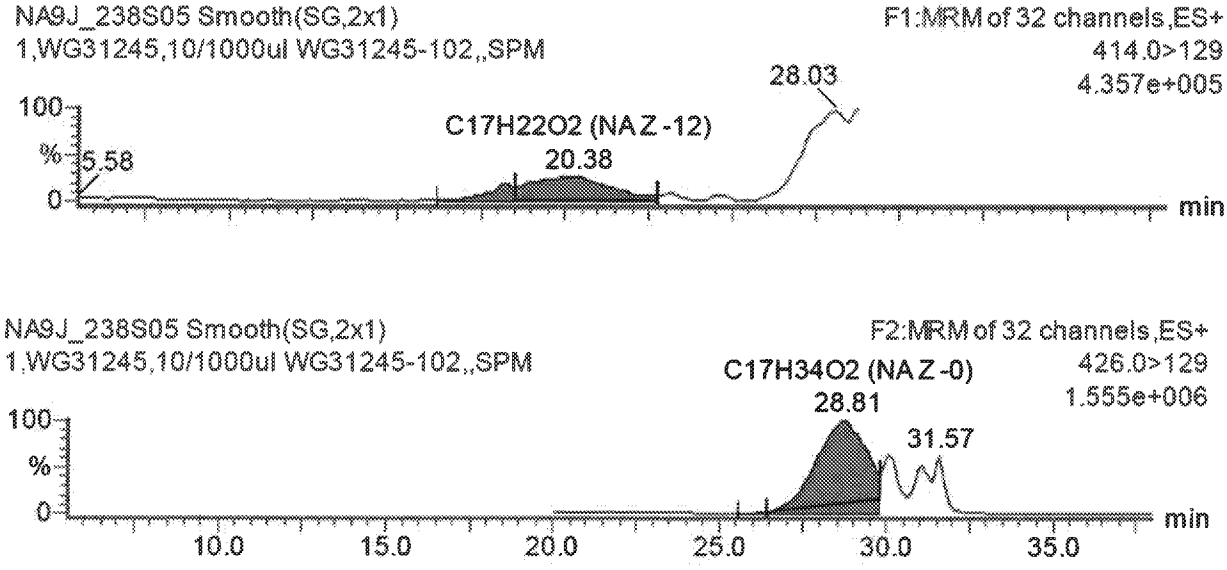
* Compounds that don't fit the strict definition of NA as they contain at least one aromatic ring may be included.

2. Table 2 is a copy of Table 1 from the AXYS Method (page 1 of the MSU-077C summary document. The table shows each of the sixty separate analytical categories of naphthenic acids reported to be analyzed using the AXYS method. Note that four of the 60 NA categories are asterisked, stating that it is possible that some of the compounds within those analytical groups might contain one or more aromatic rings, which do not fit the "strict definition" of a naphthenic acid. This also seems to suggest that the commercial mix "Merichem NA" that the method uses for control samples may also contain some aromatic acid species and possibly some di- or tricarboxylic acids.[2] Because the laboratory states that these aromatic compounds would be included within these categories, this logically seems to mean that the AXYS method cannot recognize whether the observed unsaturation in a particular parent mass spectral ion is caused by double bonds or by an aromatic ring (at least not by the molecular weight of the ion alone). A six-carbon aromatic ring is unsaturated by the equivalent of six hydrogens, so it would have a "z" number of "-6", before it is attached in some manner to the rest of the fatty acid chain, but this could be masked by the "z" factor present in the rest of the carbon chain. If the presence of aromatic rings could be determined by the method, then presumably such compounds could have been subtracted from the results for these analytical groups. This could have significant implications if the toxicological properties of NA's with aromatic rings are significantly different than those of the

[2] Environment Canada has concerns about the representativeness of the Merichem NA mixes compared to oil-sands process-affected water as described later in this report.

aliphatic NA compounds. Furthermore, if the presence of an aromatic ring in the carbon chain of an NA cannot be recognized, how does AXYS know whether there could be other aromatic NAs included within some of the other categories?

3. Ionization efficiency of NAs change with the structure of the compound and the matrix of the sample. This variation in ionization efficiency renders HPLC MS with electrospray ionization problematic for such complex mixtures.
4. On page six of the AXYS method summary, there are a series of seven chromatograms of groups of NAs containing 17 carbons, showing (presumably derivatized) mass values with parent MWs of 414 through 426. Presumably because these peaks are generated by a number of different isomers, the peaks have very broad retention times. Most are greater than five minutes, and all have undulations within each peak. In particular, in the mass 414 chromatogram the peak that crests at 20.38 minutes seems to have its low end retention time (RT) window clipped short due to another peak of the same mass appearing within the original RT window. Also, for mass 426, the peak at 28.81 minutes is clearly significantly influenced by some later peaks of the same mass, and apparently a manual integration was necessary. EPA requires all manual integration to be well documented. A highly experienced analyst can exercise his or her professional judgement on these integration issues (provided there is appropriate documentation), but this has its limits, and may become impossible if the chromatograms become too complex. Below are the chromatograms in question, for MW 414 and MW 426.



5. We do not know whether the chromatograms from page 6 (depicted above) are of a quality control (QC) sample or a real oil sands sample. Nor do we know if a smoothing

function has been used, as suggested by the label, "smooth," and if so, if that practice altered the analytical results. Particularly for untreated refinery wastewater which can be generated from many types of raw crude and be products of differing refinery processes, it is likely that these chromatograms could become far more complex, with substantially more likelihood of uncertainty entering into the analysis. Environment Canada mentioned this as one of their conclusions to the 2016 Inter-laboratory Study they conducted. They stated: "The complexity of the background matrix needs to be increased further. The synthetic toxicity testing matrix is suitable for method validation purposes but future inter-laboratory studies should use a natural water matrix for all samples." Presumably this would also include refinery wastewater matrices for studying refineries. The 2016 Inter-laboratory was focused on oil-sands process-affected water and is not representative of refinery wastewater, either untreated or treated.

6. We note that this AXYS summary does not discuss any QC analytical check on the verification of the completeness of the derivatization efficiency, or address how the derivatization might perform on actual refinery samples, which presumably may contain di- or tri-carboxylic acids. Does the instrument recognize di and tri-carboxylic acids, even if they form fragments that contain only one carboxyl group? Does a fresh reagent fully derivatize all carboxyl groups in any compound? What if only one of the carboxylic groups is successfully derivatized in a di- or tri-carboxylic acid? Could the parent compound, or a potential mass ion fragment of the parent compound, be mistakenly identified as a monocarboxylic acid, and counted as a naphthenic acid? How is it determined whether stored derivatization reagent has become less effective over time? Finally, even if di- and tri-carboxylic acids are not included in the NA quantification when using the AXYS method, they possibly still could be present in acid extractions from samples containing naphthenic acids, which may have implications when performing toxicity studies on these extractions.

C. Inter-laboratory studies of the analysis of naphthenic acids

There were two inter-laboratory studies performed for the naphthenic acids analyses, one in 2012, and a second in 2016. However, the primary focus of both of these studies was the analysis of "total naphthenic acids" and only the total NA values were evaluated as to accuracy and precision among all of the participating laboratories. Triplicate samples were typically provided, and the laboratories reported their individual results as well as the mean of their triplicate analyses. (The mean value reported was the value that was evaluated in most cases.) The samples included reagent water blanks, spikes generated from Merichem naphthenic acid reference material, and other samples were of oil sands process-affected waters (OSPW). There were two main categories of analyses for total NA. An FTIR Method that can only give results as total naphthenic acids was used by many of the laboratories. There were a variety of LC/MS and LC/MS-MS methods also used by several laboratories. While these methods can achieve varying degrees of speciation

depending on the method, they also can be used to obtain a total NA value by summing up the values from all of the measured subcategories of NAs. Environment Canada evaluated the score for these laboratories only using the total naphthenic acid results since the degree and type of speciation varied greatly among the different laboratories and was evidently not comparable.

The 2012 Environment Canada Naphthenic Acids Inter-laboratory (ECNAIL) study found that some of the laboratories using both FTIR and some of the LC/MS methods could reasonably reproduce total naphthenic acid results. There was some speciation information displayed in Appendix A of the 2012 study from the various GC/MS, LC/MS, and LC/MS-MS methods, however the speciation was limited to different degrees of saturation (the "z" factor, even numbers zero through twelve, forming seven speciation categories). These categories did not differentiate based on the number of carbon atoms. The 2012 report concludes regarding speciation of the NA compounds: "The data demonstrated the capability of certain methodologies to characterize NA by carbon number as a percentage of the Total $C_nH_{2n+Z}O_2$ species, however, complexity of the speciation data made comparative evaluation impractical."

The 2016 ECNAIL study report was smaller, involving only nine laboratories, but it did not address potential speciation of the NAs. Four of the nine laboratories used an FTIR method. Five of the nine laboratories used some variant of LC/MS or LC/MS-MS methods, but it is unknown whether any of these methods were identical to one-another. On average, the FTIR methods were biased low at 78% of the target values on average, with every FTIR laboratory having a negative bias. The LC/MS labs were biased somewhat high, on average 108% recovery, but the range of biases by laboratory was -19% on up to +40% (that is, the average percent recovery by laboratories performing an LC/MS method ranged from 81% to 140%). The OSPW samples had on average lower recovery by all methods, averaging 67% recovery, while the Merichem NA standard reference material had on average 113% recovery by all methods. These values demonstrated that for "total naphthenic acids" these analyses in general were reasonably quantitative among the different laboratories, but there were some significant differences depending on the sources of the reference materials.

The AXYS laboratory participated in both the 2012 and 2016 study. In both studies, they tended to be biased somewhat high for total NA (approximately +20% of the target values on samples with NA values greater than 1 mg/L), and they were approximately in the middle of the ranges for laboratories using one of the LC/MS or LC/MS-MS methods. Their in-lab precision was good, and they had no outlier results from either study.

The conclusions from the 2016 study (pages 18 and 19) contain some interesting comments that are reported below, roughly in order of importance:

- Environment Canada states in conclusion number 7: "The current definition of Total Naphthenic Acids ($C_nH_{2n+z}O_2$) as used in this study needs to be broadened to include aromatic

O2 species." API/AFPM does not agree with this conclusion, as described in Section VI of this report.

- Conclusion number 3 states: "The correlation coefficient for all laboratories is >0.96 for all laboratories indicating that main factor in any laboratory imprecision is a bias of some kind as opposed to some random errors or blunders in the laboratory." API/AFPM agree with this conclusion. Among the items that likely creates an inherent bias is trying to use a single calibration material to quantitate mixtures of compounds that can differ significantly in their overall makeup from site to site. It should be noted the calibration ranges were different across all of the methods in the interlaboratory study, with some being outside of the measured analyte range. This practice results in an inherent bias in the study.

- Conclusion number 6: "There is a need to establish a traceable quantification standard to achieve consistent analytical results. Merichem® is a commercially available mixture of naphthenic acids that allowed for an inter-laboratory comparison of laboratories' abilities to measure Total NA. It is currently the best available representation of the Total Naphthenic Acids ($C_nH_{2n+z}O_2$) which are reported in this study. However, it needs to be replaced with a commercially available, traceable material (single component or mixture) that better represents the NA components found in relevant matrices of the Athabasca oil sands region (e.g. OSPW)." This is also an important issue for API/AFPM. The assay information on these Merichem NA mixtures (from Appendix A of the 2016 study) indicates only that they are 95-99% naphthenic acids, and 1-5% petroleum distillates. It has a total acid number of 191 (with an acceptance range of 170-210). There is no information whatsoever as to specific quantities of which categories of naphthenic acids are included in this material, and it is not a traceable standard.

- Conclusion number 10 also discusses reference materials: "An OSPW derived reference material is required that can be used to compare without bias the various methods being used for NA analysis." API/AFPM is very concerned about this. Does this mean that each site or each refinery might need its own reference material for calibrations?

- Conclusion number 1 from the 2016 study discusses how the results from this study are significantly improved over much poorer results that were obtained from a 2014 inter-laboratory study for naphthenic acids, where the overall RSD values for the samples varied from 64% to 168%, with only the three highest samples having RSDs below 100%. (API/AFPM believes that if these RSD results are correct, this constitutes unacceptable method performance.) **This 2014 naphthenic acid study was not included in the information given to API/AFPM.**

- Conclusion number 8: "The complexity of the background matrix needs to be increased further. The synthetic toxicity testing matrix is suitable for method validation purposes but future inter-laboratory studies should use a natural water matrix for all samples." API/AFPM agrees that this is needed, and has stated that actual refinery samples, especially untreated wastewater samples, can greatly complicate the analytical process for many well-established methods let alone these AXYS experimental procedures currently being developed.

IV. Discussion of Analytical Methods for Alkylated PAH Compounds and the 2015 Environment Canada Inter-laboratory Study

A. Overview of methodology

The analytical list for "alkylated PAHs usually includes the 16 standard EPA priority pollutant PAHs, "extended PAHs" (meaning additional single-compound PAHs or PAH-associated compounds), and alkylated PAHs, which are analyzed as individual groups of alkyl-substituted PAH homologs. Most laboratories use a GC/MS instrument as is used in EPA SW-846 Method 8270D.[3] Many labs operate the MS in a selective ion monitoring (SIM) mode to obtain greater sensitivity, with the possible drawback being they do not obtain a full mass spectrum of each compound. The SGS-AXYS Laboratory Method MSU-21C uses their MS operating in an Electron-Impact Ionization (EI) mode using Multiple Ion Detection (MID). We are not currently familiar with the advantages/disadvantages inherent to this type of MS setting. The main point here is that the methods used by the participating laboratories in the 2015 study discussed in Section B below, though similar in instrumentation, may not be exactly the same. In Section I of this report, we have also discussed that there is ongoing debate within the analytical community as to which extended PAH compounds and alkylated PAH homologs should routinely be included in the parameter list for this determination.

B. 2015 environment Canada inter-laboratory study shows major problems in quantifying the groups of PAH homologs

Environment Canada performed an Inter-laboratory Study for Alkylated PAH compounds, the report of which is dated April, 2015. API/AFPM received a copy of this report from EPA. Three sample matrices were tested (with four samples provided for each matrix): extract samples consisting of three different diluted oils, one National Institute of Standards and Technology (NIST) standard in methylene chloride, and synthetic soils samples spiked with three different oil sources. Four samples were provided for each matrix. Our primary concern here is on the four aqueous samples, but we also include a comparative discussion on the analyses of the extract that is spiked with the NIST certified mixture.

The results for the aqueous samples in this inter-laboratory study paint a completely different picture of two types of PAH analyses (see Table 3 below, which is a compilation of the aqueous results from Tables 3 and 4 on pages 10 and 11 from the 2015 Environment Canada Inter-laboratory study on Alkylated PAH analyses). As expected, all of the laboratories analyzed the parent PAHs (all single compounds, each with their own calibration curves) and achieved

[3] EPA, *Test Method for Evaluating Solid Waste: Physical-Chemical Methods Compendium (SW-846)*, Office of Land and Emergency Management, Washington, D.C.

acceptable Relative Target Standard Deviations (RTSD), with the average values being between 20 and 25% RTSD.[4] The parent PAH data for water and the other matrices is presented in Table 3 on page 9 of the Environment Canada Report.

However, for the PAH homolog analyses (found in Table 4 on page 11 of the Environment Canada report), the results of the RTSDs are shockingly different, and API/AFPM considers them unacceptable. (It is important to remember that the alkylated PAH homologs are actually groups of related PAH compounds, where the calibration is based only on a single compound intended to represent the entire group.) The average RTSD for the four water samples is almost 80%, an extremely high value, and some of the RTSDs for some homolog compound groups were over 100%. Typically, in these type studies, results outside of two standard deviations are given a warning, but are still considered acceptable, and results outside of three standard deviations are considered as unacceptable. To illustrate how terrible an RTSD of 80% is (which represents only a single standard deviation around the target value), consider a spiked sample with a value of 1,000 µg/L for a particular PAH homolog group. If a result within +/- 3 std. deviations is acceptable, then in this case (using an 80% RTSD for one standard deviation, multiplied by 3 SDs), any result between the values of 0 (or non-detected) up to 3,400 µg/L would be considered an acceptable result. It is difficult to rate such results as even "semi-quantitative", because many "acceptable" results would not even be within the same order of magnitude of the true value (1,000 µg/L). It is clear that the analytical method proposed for the PAH homolog groups does not "quantitate" these compounds within any acceptable definition of quantitation. Therefore, this analytical method is unacceptable for evaluating the concentrations of such compounds in refinery wastewater.

In the Table 3 below, API/AFPM compares the average percent RTSD for the parent PAHs in the four aqueous samples with the average RTSD for the PAH homologs in these same four samples. We find that for the water samples alone, the RTSD average for the PAH homologs is actually 3.41 times higher than for the parent PAH compounds. This is significantly worse than the discussions within the Environment Canada report, which estimated that overall, the RTSD for the homologs was 2.5 to 3 times higher than the RTSD for the parent compounds. This seems to suggest that the problems analyzing aqueous samples for these parameters is significantly greater than for soils or extracts. Again, API/AFPM asserts that this performance cannot be considered as quantification of these compound/compound groups in water samples.

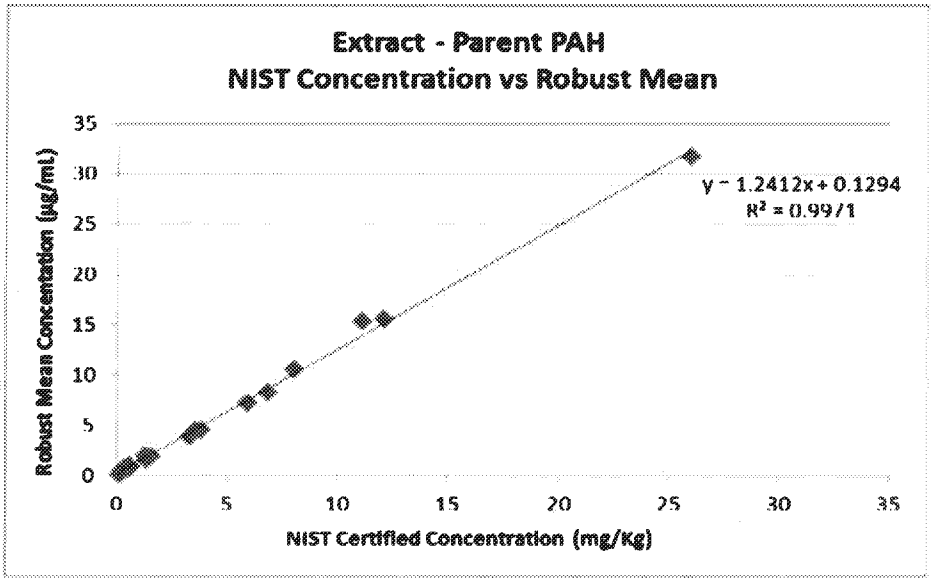
[4] An RTSD is the RSD around a known target value, instead of the mean of the reported results.

Table 3: Extracts of the Aqueous Analyses RTSDs data for alkyl-PAH Homologs (originally from Table 4 in the 2015 alkyl-PAH Inter-laboratory Study) and a summary of the average RTSDs from the aqueous analyses for the parent PAH compounds (calculated from Table 3 of 2015 report)

Aqueous samples Relative Target Standard Deviation% for PAH Homologs analyzed in Environment Canada 2015 Inter-lab Study				
Aqueous Sample Number	AAP-01	AAP-02	AAP-03	AAP-04
C1-Naphthalene	71	46	30	40
C2- Naphthalene	123	59	57	64
C3- Naphthalene	120	77	68	60
C4- Naphthalene	106	83	77	68
C1-Fluorene	91	76	66	60
C2-Fluorene	66	65	63	40
C3-Fluorene	100	95	86	91
C4-Fluorene	105	215	217	126
C1-Phenanthrene	55	45	44	29
C2- Phenanthrene	45	52	49	41
C3- Phenanthrene	80	77	79	81
C4- Phenanthrene	108	129	109	108
C1-Fluoranthene	91	76	66	60
C2- Fluoranthene	93	84	74	100
C3- Fluoranthene	68	50	57	68
C4- Fluoranthene	128	132	121	103
C1-Chrysene	27	29	31	34
C2- Chrysene	102	76	94	88
C3- Chrysene	96	96	98	81
C4- Chrysene	178	184	187	129
C1-Benzopyrene	73	78	78	78
C2-Benzopyrene	63	78	100	62
C1-Dibenzothiophene	54	42	42	42
C2-Dibenzothiophene	51	52	40	45
C3-Dibenzothiophene	83	55	57	66
C4-Dibenzothiophene	53	44	62	69
Average RTSD per sample for PAH homologs	85.77	80.58	78.92	70.50
Average RTSD per Aqueous sample for 18 parent PAH compounds	22.5	23.9	21.6	25.11
Overall RTSD Ratio Homolog over parent PAHs per sample	3.81	3.37	3.65	2.81
Average of all four ratios				3.41

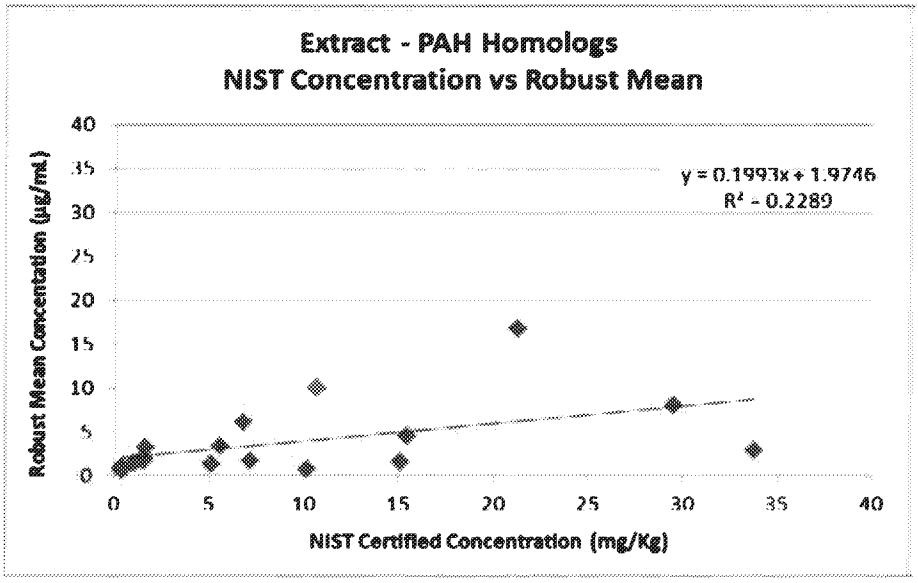
Another indication of problems related to the analysis of the PAH homologs can be seen in the extract sample that was spiked with the NIST standard. Here, any errors or biases due to sample extraction have been eliminated, and all of the values for the parent PAHs and their PAH homologs are certified. There are graphs of the analytical results of this sample on page 13 of the Environment Canada 2015 report, and two of these are shown below. It should be noted that these graphs are based on the "robust mean" and "robust standard deviation" of the data for this sample. "Robust" is defined as a statistical program that reduces the influence of any outlier results on the calculation of the "robust mean" and "robust SD" (without totally eliminating the outlying data points), so that these calculations are not unduly influenced by such outliers. Therefore, these graphs already contain a degree of correction for the worst outlier results.

The first graph (below) is for the results of the parent PAH compounds in the NIST sample extract:



As can be seen, the correlation coefficient of the parent PAH compounds versus the robust mean of the NIST extract sample is satisfactory ($R^2 = 1.0000$ is perfect correlation).

This second graph is for the PAH homologs:



The correlation coefficient of the PAH homolog compounds vs. the robust mean is only 0.2289. This is extremely poor, especially for a sample that is a simple dilution of an NIST standard that did not have to be extracted. The evidence is clear that there are severe problems with the calibrations being used for the PAH homologs.

C. Summary of Conclusions Discussed in the 2015 Environment Canada Inter-laboratory Study for PAH and PAH homolog analysis

The Environment Canada conclusions show they are aware of the issues with the quantification of the PAH homologs. They first state that the results of the analyses of the parent PAH compounds were not unexpected. They stated that most of these compounds have been routinely analyzed by most environmental labs since the 1980's, and that percent RSD's of 20 to 25% are typical for these compounds.

The following is the Environment Canada assessment of the PAH homolog analysis in the conclusion to the 2015 report:

"The results for the analysis of the alkyl-PAH homologs are consistent with an analytical method that relies on only a few select compounds to represent an entire class. The quantitation of the homologs is generally done using a single compound to represent the entire class of alkyl-PAH being quantitated instead of individual compounds and this could be responsible for the increase in relative target standard deviations observed. This would be especially true if all of the compounds in a class do not exhibit the same response factors. A number of homologs in the solid samples were also too low in concentration to be accurately quantitated or even detected in some cases. This included the NIST SRM (1941b). A lack of traceable individual calibration standards for homologs may also play a part in the apparent low recoveries of the homologs as could some unfamiliarity with the practical application of some elements of the recently promulgated ASTM

D7363-11, *Standard Test Method for Determination of Parent and Alkyl Polycyclic Aromatics in Sediment Pore Water Using Solid-Phase Microextraction and Gas Chromatography/Mass Spectrometry in Selected Ion Monitoring Mode*."

API/AFPM believes that based on the results of this study, Environment Canada has greatly understated the problems observed in the aqueous analyses, especially when they state: "The quantitation of the homologs is generally done using a single compound to represent the entire class of alkyl-PAH being quantitated instead of individual compounds and this could be responsible for the increase in relative target standard deviations observed. This would be especially true if all of the compounds in a class do not exhibit the same response factors." We also note that the problems with the aqueous samples were for all four samples, not simply the low concentration results.

Environment Canada also states that this first study may have been too ambitious and possibly included too many compounds and homologs for analysis:

"This first assessment of the current state of the PAH and alkyl-PAH analysis of environmental samples was rather ambitious. Over 100 separate measurands were asked to be reported in 3 separate matrices. Future studies will focus on a target list more closely approximating the one found in ASTM D7363-11."

API/AFPM believes that the analyses of so many types of alkylated PAHs is far too complex and that methods for measuring groups of alkylated PAHs are nowhere near sufficiently developed for any EPA study of refinery wastewaters, or any follow-up rulemaking effort.

V. Concerns About Blanket Toxicity Assessments of Groups and Categories of Compounds

A. Brief Background

In the EPA ELG process, the pollutants estimated to be removed by a proposed rule have been given a toxic weighting factor (TWF) based on toxicological tests having been performed in the past on that specific pollutant. The calculated TWF for each pollutant is actually the sum of an aquatic life toxicity value, and a human health toxicity value that are both normalized to the TWF of copper.[5] The TWF formula for pollutants in water is:

$$TWF = (5.6/AQ_{value}) + (5.6/HH_{value})$$

Where:

[5] Copper as a reference toxicant was selected by EPA years ago because its toxicity was about in the middle of pollutants being tested at the time.

5.6 (μg/L) = acute aquatic toxicity of copper at a specified hardness that is used as the scaling factor to normalize the TWF in relation to copper

AQ = Aquatic Life Value (μg/L). This is determined experimentally through toxicity testing on aquatic organisms.

HH = Human Health Value (μg/L). A few pollutants have acute human toxicity, but most times the HH factor is based on potential carcinogenic properties of the compound.

Except in rare cases, the TWF is dominated by either the AQ value, indicating toxicity to aquatic life is the predominant effect, or the HH value if there is a significant human health risk. While there are rare exceptions due to acutely toxic properties of specific compounds or potential unusual human exposure pathways—for trace organic compound contamination in water, the HH value is typically not going to be significant to the TWF calculation unless that compound is demonstrated to have potential or confirmed carcinogenic properties.

As example of this, consider the sixteen PAH compounds currently on the EPA priority pollutant list. Seven of these compounds have been identified as potentially carcinogenic through the aqueous-fish-shellfish exposure pathway, and these seven have by far the highest TWFs of the sixteen compounds. Benzo(a)pyrene is the highest of the seven with a TWF of 100, and the lowest two are benzo(b) and benzo(k) fluoranthene, both with a TWF of 30.66. Of the nine considered to be "non-carcinogenic" PAHs, the highest is fluoranthene, with a TWF of 1.27.[6] The lowest TWF of the nine "non-carcinogenic" PAHs is acenaphthylene, with a TWF of 0.0084. This compound was found to have "no observed effect" on mice, and has no HH value, so this TWF is totally based on aquatic life impacts. Note that the acenaphthylene TWF is more than 10,000 times lower than that of benzo(a)pyrene. It is an indication that if an individual compound is not carcinogenic, a TWF based entirely on aquatic life toxicity may be thousands of times lower.

B. Relating TWF factors to mixed groups of compounds, and testing for toxicity

Because the discussion above is applicable to assigning TWFs to categories of mixed compounds, it creates significant problems. Carcinogenic effects are applicable to only specific compounds because the carcinogenic interaction is produced at the molecular level, at specific sites of the molecules that mimic critical enzymes. The addition of a methyl group to a critical area of a molecule may create a stearic hindrance that may completely prevent this molecular interaction. This is why, even among the 16 PAH priority pollutant compounds that are very similar in structure some have been found to be carcinogenic and others show no carcinogenic effect whatsoever.

Each analytical group of naphthenic acids can be mixtures of dozens or hundreds of different compounds, and the total naphthenic acids can consist of thousands of compounds. The only

[6] Though fluoranthene is not classified as a class 3 carcinogen to humans as are the other seven, one study has found it to possess carcinogenic properties to newborn mice, so it still retains a HH value.

common denominator among these compounds is that they contain a single carboxylic acid group, and the attached carbon chains must be aliphatic, (but even this is being questioned by Environment Canada). As we have previously stated, most of *aliphatic* NAs (in the C12 to C21 carbon range), that meet the strict definition of NAs as used by the AXYS are naturally occurring aliphatic saturated or polyunsaturated fatty acids that are commonly found in foods and dairy products, and these compounds should not be toxic.

Some papers have discussed how oil-sands process-affected water contains numerous organic compounds, including naphthenic acids (NAs), and a few papers have asserted NAs as a source of acute toxicity in oil-sands process-affected water. Total NAs, however, defy generic characterization and the toxicity of "NAs" cannot be meaningfully expressed as though NAs constituted a single compound or a consistent, reproducible mixture of compounds. To quote one scientific review on naphthenic acids[7]: "The field continues to be challenged by the lack of a cost-effective, accurate analytical technique for NAs or an understanding of all the organic constituents in process-affected water that may be contributing to observed toxicity and thus requiring treatment."

As discussed in this report, even possibly the most specific analyses for NAs such as the method used by AXYS laboratories can still include other types of compounds that do not meet the definition of naphthenic acids. Just as in the example for PAH compounds discussed earlier, it is entirely possible for only a very few compounds to be the drivers for most or all of the apparent toxicity when addressing a situation of a mixture of hundreds or thousands of compounds. Also, it is unknown, and unlikely, that the naphthenic acids that remain in refinery wastewater after treatment contain the same toxic compounds/mixes that appear to be present in oil-sands process water.

The fact that the analytical method measures total NAs makes the toxicological testing of these naphthenic acid mixes (and also mixes of PAH homologs) a very difficult and inexact procedure. There must be some kind of reference chemical available commercially that is used to perform the toxicity testing. If the toxicity is due to only a few highly toxic compounds present in a mostly non-toxic mixture and one does not know which compounds they are, whether they are present in every mix, or whether they are present in some mixes from some sources and not others, how can a TWF for the mixture be estimated? Are they present in only some wastewaters that contain naphthenic acids and not others? Regulation of total NAs on this basis will invariably result in false positives prompting exceedance violations for dischargers presenting no significant increase to environmental toxicity. These issues are why toxicity testing has (mostly) been limited to testing one pure individual compound at a time, to increase the likelihood that consistent and reproducible results can be obtained when using the same standard reference material.

[7] Oil Sands Naphthenic Acids: A Review of Properties, Measurement, and Treatment, Brown and Ulrich, 2015

There are some very serious shortcomings to the current commercially available consensus reference material used by AXYS, which is the Merichem NA mixture. This mixture was used as a standard reference for the NA comparative studies, and AXYS Laboratory also uses Merichem mixtures as their quality assurance (QA) samples for their proprietary naphthenic acid test method. This Merichem reference material apparently contains relatively consistent proportions of the 60 naphthenic acid subcategories analyzed by AXYS, so it can be used as a QC sample to verify consistent results in their analyses over time. However, the exact makeup of the various specific compounds is unknown, and these samples only demonstrate that the unknown can be reproduced consistently. The summary API/AFPM received of the AXYS method indicates that the laboratory appears to believe some of the fractions found in the commercial Merichem NA mixture do contain some aromatic naphthenic acids. It is possible that some of these aromatic acids could have much higher toxicity than the normal aliphatic NAs. Our impression is that the AXYS method cannot quantify the aromatic NAs separately, otherwise they could be subtracted out of the total. Finally, Environment Canada, in their conclusion to the 2016 NA Inter-laboratory Study stated: "There is a need to establish a traceable quantification standard to achieve consistent analytical results. Merichem® is a commercially available mixture of naphthenic acids that allowed for an inter-laboratory comparison of laboratories' abilities to measure Total NA. It is currently the best available representation of the Total Naphthenic Acids ($C_nH_{2n+z}O_2$) which are reported in this study. However it needs to be replaced with a commercially available, traceable material (single component or mixture) that better represents the NA components found in relevant matrices of the Athabasca oil sands region (e.g. OSPW)." (Important to note: Environment Canada here appears to be asking for a reference material that is representative of a single site. Does this mean that each site and each refinery should obtain a mix that matches their site alone?)

C. Summary of the Main Issues for determining toxicity for Naphthenic Acids (also generally applicable to alkylated PAH homologs)

The following bullet items are just a few of the complex issues that must be dealt with, if one is to apply a single TWF to large groups of compounds such as naphthenic acids or alkylated PAH homologs:

- These NA or alkylated PAH homologs mixtures can contain hundreds of compounds, and if present, it is very likely that only a tiny fraction of these compounds may have a high TWF but this fraction might drive the overall toxicity of the entire group. These few toxic compounds have likely not yet been identified, but they may be present in samples from one source, and not present in another, with dramatic effect on the future evaluation of the TWF.

- Performing the tests to determine toxicity: As stated by analysts and Environment Canada, there is not yet available a commercial material that is traceable quantitatively, where all the components are identified. If individual lot numbers of this commercial material are used as **a standard to determine toxicity**, it appears they face the same problem—do certain lots of the mix contain fewer or more of the limited number of compounds that can drive the toxicity,

and is the mix representative of the types of naphthenic acids present at various facilities? How do you prepare a mix to certain toxicity specifications, if you do not know what compounds are present in the wastewater that can create the most toxicity?

- In the case of determining the toxic-weighted pound equivalents (TWPE)[8] for a refinery effluent, the standard mix used to determine a TWF for NAs needs to be toxicologically representative of the naphthenic acids present in the discharge from a refinery after biological and other treatment. This is likely to be very different than the mix of naphthenic acids present in untreated refinery wastewater, and even further different than oil sands process water used to mine the oil.

- Environment Canada believes that aromatic-naphthenic acids (this term is seemingly self-contradictory, since the word "naphthenic" is used to define mixtures of organic fluids that are low in aromatic content) should be included in the analysis of NAs. If, as might be the case, the aromatic NAs have significantly different toxicological/environmental properties than the currently defined aliphatic NAs, then what is the justification for including them in the same category? Perhaps a separate definition and scientifically defensible analytical procedure should be devised that can analyze for aromatic NA's only.

[8] The TWPE is used by EPA to estimate the total mass loadings of all toxic pollutants in a specific industrial effluent category for the purposes of comparing industrial point source categories for their relative contribution ot surface water discharges of toxic pollutants.

Message

From: Keenan, Dru [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=9525DC06E2E74BB89DA45F7E19B2E0CA-KEENAN, DRU]
Sent: 5/21/2018 9:47:35 PM
To: Mann, Rachel [rkmann@hunton.com]
CC: McGrath, Kerry L. [KMcGrath@hunton.com]; loren.moore@deq.idaho.gov; Ross, David P [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=119cd8b52dd14305a84863124ad6d8a6-Ross, David]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Sawyers, Andrew [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=49214552a00b4ab7b168ec0edba1d1ac-Sawyers, Andrew]; McDonough, Owen [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=10a92c71b552413694fed6fa08522f4f-McDonough,]
Subject: RE: UWAG Request for Extension of Comment Period for Idaho General Permit for Hydroelectric Facilities

Dear Ms. Mann,

The EPA is receipt of the Utility Water Act Group's request for an extension to the public comment period for the Draft General Permit for Hydroelectric Facilities in Idaho. We received a similar request from Idaho Power Co. In response to Idaho Power's request, we are granting an extension to the comment period. We are extending the deadline to submit comments to June 26, 2018. The original comment period was for 45 days; with this extension, we are now providing a 60 day comment period.

The EPA will put a notice in the Federal Register extending the comment period. We are also notifying our distribution list and putting the extension on our Website.

Best regards,

Dru

Druscilla M. Keenan
U.S. EPA Region 10
1200 6th Ave Suite 900 M/S 155
Seattle, WA 98101
keenan.dru@epa.gov
206-553-1219

From: Mann, Rachel [mailto:rkmann@hunton.com]
Sent: Monday, May 21, 2018 2:35 PM
To: Keenan, Dru <keenan.dru@epa.gov>
Cc: McGrath, Kerry L. <KMcGrath@hunton.com>; loren.moore@deq.idaho.gov; Ross, David P <ross.davidp@epa.gov>; Forsgren, Lee <Forsgren.Lee@epa.gov>; Sawyers, Andrew <Sawyers.Andrew@epa.gov>; McDonough, Owen <mcdonough.owen@epa.gov>
Subject: UWAG Request for Extension of Comment Period for Idaho General Permit for Hydroelectric Facilities

Please see the attached request for extension.

HUNTON
ANDREWS KURTH

Rachel Mann
Senior Professional Assistant
rkmann@HuntonAK.com
p Ex. 6

Hunton Andrews Kurth LLP

2200 Pennsylvania Avenue, NW
Washington, DC 20037

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Message

From: Baer, Louis [LBaer@cement.org]
Sent: 8/3/2018 1:38:41 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
CC: Franklin, Charles [CFranklin@cement.org]
Subject: Thank You
Attachments: PCA Meeting Thank You_Forsgren_08022018.pdf

Lee,

We just wanted to show our appreciation and thanks for meeting with PCA staff and our members leaders to discuss the our issue priorities with EPA's Office of Water. Attached is our formal thank you note. We look forward to continuing our engagement with you and the Office of Water.

Best,
Louis

Louis A. Baer, Esq., CPEA
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August 2, 2018

Lee Forsgren
Deputy Assistant Administrator
Office of Water
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue NW
Washington, D.C. 20460

Dear Mr. Forsgren:

On behalf of the Portland Cement Association (PCA), I wish to thank you and Ann for taking the time to meet with PCA staff and member leaders to discuss the Waters of the United States (WOTUS) Rule and other priorities of the Office of Water last week.

PCA staff and member leaders appreciated the opportunity to inform you about the cement industry and the industry stances on water regulatory issues. We also appreciated hearing your insights and feedback on WOTUS and other rulemaking priorities at EPA's Office of Water.

As our country and our industry work towards the common goals of sustainability, economic growth, innovation and excellence in environmental stewardship, construction, and restoring our infrastructure, our discussion will help advance them.

Again, thank you for meeting with us. PCA looks forward to continuing our engagement with you and the Office of Water.

Sincerely

Charles Franklin
Vice President and Counsel, Government Affairs

Message

From: Mann, Rachel [rkmann@hunton.com]
Sent: 5/21/2018 9:34:56 PM
To: Keenan, Dru [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9525dc06e2e74bb89da45f7e19b2e0ca-Keenan, Dru]
CC: McGrath, Kerry L. [KMcGrath@hunton.com]; loren.moore@deq.idaho.gov; Ross, David P [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=119cd8b52dd14305a84863124ad6d8a6-Ross, David]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Sawyers, Andrew [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=49214552a00b4ab7b168ec0edba1d1ac-Sawyers, Andrew]; McDonough, Owen [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=10a92c71b552413694fed6fa08522f4f-McDonough,]
Subject: UWAG Request for Extension of Comment Period for Idaho General Permit for Hydroelectric Facilities
Attachments: UWAG Extension Request for Idaho GP for Hydro 5-21-18_69533993_3-c.PDF

Please see the attached request for extension.

HUNTON
ANDREWS KURTH

Rachel Mann
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p Ex. 6

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KERRY L. MCGRATH
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EMAIL: kmcgrath@HuntonAK.com

FILE NO: 29142.060067

May 21, 2018

Via E-Mail

Ms. Dru Keenan
Office of Water and Watersheds
U.S. EPA Region 10
1200 Sixth Avenue
Suite 155, OWW-191
Seattle, WA 98101
keenan.dru@epa.gov

Re: Request for 30 Day Extension of Comment Period for EPA Region 10 Proposed Issuance of NPDES General Permit for Hydroelectric Facilities Within Idaho, 83 Fed. Reg. 18,555 (Apr. 27, 2018).

Dear Ms. Keenan:

The Utility Water Act Group ("UWAG") respectfully requests a thirty-day extension of the comment period on the U.S. Environmental Protection Agency ("EPA") Region 10 request for input on the Proposed Issuance of NPDES General Permit for Hydroelectric Facilities Within the State of Idaho. 83 Fed. Reg. 18,555 (Apr. 27, 2018). Comments are currently due on June 11, 2018. UWAG requests that the comment period be extended through July 11, 2018, and that EPA promptly notify the public regarding any applicable extension.

UWAG is a voluntary, non-profit, unincorporated group of 153 individual energy companies and three national trade associations of energy companies: the Edison Electric Institute, the National Rural Electric Cooperative Association, and the American Public Power Association. UWAG members operate hydroelectric facilities, power plants, and other facilities that generate, transmit, and distribute electricity to residential, commercial, industrial, and institutional customers. One of UWAG's purposes is to participate on behalf of its members in EPA regulatory actions under the Clean Water Act ("CWA") and in litigation arising from those regulatory actions. UWAG's membership includes owners and operators of hydroelectric facilities that would be affected by the adoption and issuance of the Proposed General Permit.

Given extensive experience with hydroelectric utilities and NPDES permitting issues, UWAG is uniquely positioned to offer an important perspective on the Proposed General Permit. Because this proposal presents issues of first impression regarding the applicability of CWA section 316(b) to hydroelectric facilities, and, if applicable, the appropriate standards for such

Sierra Club v. EPA 18cv3472 NDCA Tier 1 ED_002061_00095347-00001

facilities, additional time is warranted. In order to provide meaningful comments, we must have adequate time to consider the Proposed Permit, Fact Sheet, and Water Quality Certification and develop appropriate recommendations. Further, there do not appear to be any statutory or court ordered deadlines that would prevent EPA from granting the request to extend the comment period.

We have discussed the Proposed Permit with other stakeholders and there are similar concerns with the duration of the public comment period given the significance of the Proposed Permit. EPA will likely receive additional requests for extension of the public comment period.

We respectfully request that EPA provide an additional thirty days, through July 11, to comment on the proposed permit and notify the public as soon as possible as to the extension. Thank you for your prompt attention to this important matter.

Sincerely,

Kerry L. McGrath

cc: Loren Moore, Idaho Department of Environmental Quality (loren.moore@deq.idaho.gov)
David Ross, EPA Headquarters (Ross.davidp@epa.gov)
Lee Forsgren, EPA Headquarters (Forsgren.lee@epa.gov)
Andrew Sawyers, EPA Headquarters (Sawyers.andrew@epa.gov)
Owen McDonough, EPA Headquarters (McDonough.owen@epa.gov)

Message

From: Baer, Louis [LBaer@cement.org]
Sent: 5/4/2018 8:32:59 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
CC: Franklin, Charles [CFranklin@cement.org]; Derby, Rachel [RDerby@cement.org]; Mayer, Lauren [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=7e806d6189b44868a53ff4bdce1af43e-Mayer, Laur]
Subject: Thank You - PCA and NACA
Attachments: PCA Fly-In Thank You_Forsgren_05022017.pdf

Lee,

The Portland Cement Association and North American Concrete Alliance would like to thank you for taking the time to speak on our Waters of the United States (WOTUS) Panel on April 25. Attached is our formal thank you letter. Thank you very much for contributing to a successful and memorable event for our members. Have a great weekend.

Best,
Louis Baer

Louis A. Baer, Esq., CPEA
Director/Assistant Counsel, Government Affairs
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May 2, 2018

Lee Forsgren
Deputy Assistant Administrator
Office of Water
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue NW
Washington, D.C. 20460

Dear Mr. Forsgren:

On behalf of the Portland Cement Association (PCA) and the North American Concrete Alliance (NACA), I wish to thank you for taking the time to speak on our Waters of the United States (WOTUS) Panel at the Second Annual Cement and Concrete Washington, D.C. Fly-In last week.

Our members appreciated hearing your perspective on WOTUS and priorities at EPA's Office of Water, giving them a new way to understand this Administration's commitment to public policy and stakeholder engagement. They were also complimentary of the thoughtfulness of your remarks.

As our country and our industry work towards the common goals of sustainability, economic growth, innovation and excellence in environmental stewardship, construction, and restoring our infrastructure, discussions like these help advance our efforts. We hope to continue on this dialogue in the future.

Again, thank you for contributing to a successful and memorable event.

Sincerely

Charles Franklin
Vice President and Counsel, Government Affairs

Message

From: Wheeler, Andrew R. [Andrew.Wheeler@FaegreBD.com]
Sent: 4/12/2018 9:55:11 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: Re: Andrew Wheeler CONFIRMED by the US Senate as Deputy Administrator

Thanks Lee!

Sent from my iPhone

On Apr 12, 2018, at 4:47 PM, Forsgren, Lee <Forsgren.Lee@epa.gov> wrote:

> Andrew,
> Can't wait for you to get here.
>
> Lee
>
> **From:** Wheeler, Andrew R. [mailto:Andrew.Wheeler@FaegreBD.com]
> **Sent:** Thursday, April 12, 2018 4:43 PM
> **To:** Lyons, Troy <lyons.troy@epa.gov>; Ford, Hayley <ford.hayley@epa.gov>; Abboud, Michael <abboud.michael@epa.gov>; Baptist, Erik <Baptist.Erik@epa.gov>; Beach, Christopher <beach.christopher@epa.gov>; Beck, Nancy <Beck.Nancy@epa.gov>; Bennett, Tate <Bennett.Tate@epa.gov>; Block, Molly <block.molly@epa.gov>; Bodine, Susan <bodine.susan@epa.gov>; Bolen, Brittany <bolen.brittany@epa.gov>; Bolen, Derrick <bolen.derrick@epa.gov>; Bowman, Liz <Bowman.Liz@epa.gov>; Brown, Byron <brown.byron@epa.gov>; Burke, Marcella <burke.marcella@epa.gov>; Chancellor, Erin <chancellor.erin@epa.gov>; Cook, Steven <cook.steven@epa.gov>; Cory, Preston (Katherine) <Cory.Preston@epa.gov>; Daniell, Kelsi <daniell.kelsi@epa.gov>; Darwin, Henry <darwin.henry@epa.gov>; Darwin, Veronica <darwin.veronica@epa.gov>; Dominguez, Alexander <dominguez.alexander@epa.gov>; Dravis, Samantha <dravis.samantha@epa.gov>; Falvo, Nicholas <falvo.nicholas@epa.gov>; Feeley, Drew (Robert) <Feeley.Drew@epa.gov>; Ferguson, Lincoln <ferguson.lincoln@epa.gov>; Forsgren, Lee <Forsgren.Lee@epa.gov>; Fotouhi, David <Fotouhi.David@epa.gov>; Frye, Tony (Robert) <frye.robert@epa.gov>; Gordon, Stephen <gordon.stephen@epa.gov>; Greaves, Holly <greaves.holly@epa.gov>; Greenwalt, Sarah <greenwalt.sarah@epa.gov>; Gunasekara, Mandy <Gunasekara.Mandy@epa.gov>; Hanson, Paige (Catherine) <hanson.catherine@epa.gov>; Harlow, David <harlow.david@epa.gov>; Hewitt, James <hewitt.james@epa.gov>; Hupp, Millan <hupp.millan@epa.gov>; Jackson, Ryan <jackson.ryan@epa.gov>; Kelly, Albert <kelly.albert@epa.gov>; Konkus, John <konkus.john@epa.gov>; Kundinger, Kelly <kundinger.kelly@epa.gov>; Leopold, Matt <Leopold.Matt@epa.gov>; Letendre, Daisy <letendre.daisy@epa.gov>; Lovell, Will (William) <lovell.william@epa.gov>; McMurray, Forrest <mcmurray.forrest@epa.gov>; Munoz, Charles <munoz.charles@epa.gov>; Palich, Christian <palich.christian@epa.gov>; Ringel, Aaron <ringel.aaron@epa.gov>; Rodrick, Christian <rodrick.christian@epa.gov>; Ross, David P <ross.davidp@epa.gov>; Schwab, Justin <Schwab.Justin@epa.gov>; Seabaugh, Catherine <seabaugh.catherine@epa.gov>; Shimmin, Kaitlyn <shimmin.kaitlyn@epa.gov>; Traylor, Patrick <traylor.patrick@epa.gov>; Wagner, Kenneth <wagner.kenneth@epa.gov>; Wehrum, Bill <Wehrum.Bill@epa.gov>; White, Elizabeth <white.elizabeth@epa.gov>; Wilcox, Jahan <wilcox.jahan@epa.gov>; Woods, Clint <woods.clint@epa.gov>; Yamada, Richard (Yujiro) <yamada.richard@epa.gov>
> **Subject:** RE: Andrew Wheeler CONFIRMED by the US Senate as Deputy Administrator
>
> Thank you team!! Can't wait to get over there!

Andrew R. Wheeler
Principal
andrew.wheeler@FaegreBD.com Download vCard
D: Ex. 6 M: Personal Phone / Ex. 6 | F: +1 202 312 7460

Faegre Baker Daniels Consulting
1050 K Street NW | Suite 400 | Washington, DC 20001, USA

From: Lyons, Troy [mailto:lyons.troy@epa.gov]
Sent: Thursday, April 12, 2018 4:30 PM
To: Ford, Hayley; Abboud, Michael; Baptist, Erik; Beach, Christopher; Beck, Nancy; Bennett, Tate; Block, Molly; Bodine, Susan; Bolen, Brittany; Bolen, Derrick; Bowman, Liz; Brown, Byron; Burke, Marcella; Chancellor, Erin; Cook, Steven; Cory, Preston (Katherine); Daniell, Kelsi; Darwin, Henry; Darwin, Veronica; Dominguez, Alexander; Dravis, Samantha; Falvo, Nicholas; Feeley, Drew (Robert); Ferguson, Lincoln; Forsgren, Lee; Fotouhi, David; Frye, Tony (Robert); Gordon, Stephen; Greaves, Holly; Greenwalt, Sarah; Gunasekara, Mandy; Hanson, Paige (Catherine); Harlow, David; Hewitt, James; Hupp, Millan; Jackson, Ryan; Kelly, Albert; Konkus, John; Kundinger, Kelly; Leopold, Matt; Letendre, Daisy; Lovell, Will (William); McMurray, Forrest; Munoz, Charles; Palich, Christian; Ringel, Aaron; Rodrick, Christian; Ross, David P; Schwab, Justin; Seabaugh, Catherine; Shimmin, Kaitlyn; Traylor, Patrick; Wagner, Kenneth; Wehrum, Bill; White, Elizabeth; Wilcox, Jahan; Woods, Clint; Yamada, Richard (Yujiro)
Subject: Andrew Wheeler CONFIRMED by the US Senate as Deputy Administrator
Importance: High

By vote of 53-45

Dem Senators voting "YES": Manchin (WV) , Heitkamp (ND) , Donnelly (IN),

Message

From: Tracy Mehan [tmehan@awwa.org]
Sent: 4/24/2018 1:55:45 PM
To: Ex. 6; Brent Fewell [brent.fewell@earthandwatergroup.com]; Kathryn Ruffalo [kathy@kruffalo.com]; Freedman, Jon [jon.freedman@suez.com]; Francesca McCann (McCannF@bv.com) [McCannF@bv.com]; Adam Krantz (akrantz@nacwa.org) [akrantz@nacwa.org]; Alex Beehler Ex. 6 Ex. 6; Sawyers, Andrew [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=49214552a00b4ab7b168ec0edba1d1ac-Sawyers, Andrew]; Ben Grumbles [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=usereb77e807]; Bill Teichmiller (teich4@ejwatercoop.com) [teich4@ejwatercoop.com]; Brian Oakley [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=user317ddf03]; Brooks M. Smith (bsmith@hunton.com) [bsmith@hunton.com]; Colleen Newman (Colleen@nawc.com) [Colleen@nawc.com]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; D. Randall Benn Ex. 6 Ex. 6; Nagle, Deborah [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=33888a2bbe8f48aeb4ad9cc54259fb4e-dnagle]; Debra G. Coy (debracoy@xpvwaterpartners.com) [debracoy@xpvwaterpartners.com]; Diane VanDe Hei (vandehei@amwa.net) [vandehei@amwa.net]; Eileen O'Neill (EONeill@wef.org) [EONeill@wef.org]; Tarquinio, Ellen [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=99c0c72e32d44fd4a7b7020b0ff87805-ETarquin]; Burneson, Eric [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=2cacb9a8d49f49af80531e9e2ccb9018-eburneso]; Eric Sapirstein (esap@ensresources.com) [esap@ensresources.com]; Erica Brown (brown@amwa.net) [brown@amwa.net]; Erik J. Meyers (emeyers@conservationfund.org) [emeyers@conservationfund.org]; Gail Bingham (gbingham@resolv.org) [gbingham@resolv.org]; Ames, George [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=23fe9bb4f8ed4843ae2ec8398703514c-games]; George S. Hawkins Ex. 6 Ex. 6; Gordon Binder (gordon.binder@wwfus.org) [gordon.binder@wwfus.org]; Grace Soderberg (grace@nawc.com) [grace@nawc.com]; Peck, Gregory [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=633d0632187140118ea1387b7a8169b0-GPeck]; Hank Habicht (Hank@SunToWater.com) [Hank@SunToWater.com]; Lape, Jeff [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=8d208a4970394d869eb5419e1ac8d589-Jlape03]; Joel C. Beauvais (joel.beauvais@lw.com) [joel.beauvais@lw.com]; Ryan, John P. [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=0c934574ad3d4383bd08ae1aeec72fff-Ryan, John]; Jonathan R. Pawlow (Jon.Pawlow@mail.house.gov) [Jon.Pawlow@mail.house.gov]; Dorfman, Jordan [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9b2443612937410b87c6a0a816a216eb-Dorfman, Jordan]; Julia Anastasio [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=user20bb0324]; Julia Anastasio Esq. (janastasio@apwa.net) [janastasio@apwa.net]; Tucker, Kelly [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=e378bccfa1aa4131a8f55496ad806a5f-Kelly Tucker]; Ken Maynard Ex. 6 Ex. 6; Kenneth von Schaumburg (kvonschaumburg@clarkhill.com) [kvonschaumburg@clarkhill.com]; Abhold, Kristyn [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=bfe730f27efa48beb8a6252c5ed0e71e-Abhold, Kri]; Larry J. Scully (lscully@scullycapital.com) [lscully@scullycapital.com]; Lauren Campbell (Ex. 6 Ex. 6 Temple, Leslie [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=Temple, Leslie]; Marybeth Leongini (marybeth@nawc.com) [marybeth@nawc.com]; Matthew Chiller (matthew.chiller@ch2m.com) [matthew.chiller@ch2m.com]; Matthew Ries P.E. (mries@wef.org) [mries@wef.org]; Melissa L. Meeker (mmeeker@watereuse.org) [mmeeker@watereuse.org]; Michael Curley (mc@envfin.com) [mc@envfin.com]; Michael N. Arceneaux (arceneaux@amwa.net) [arceneaux@amwa.net]; Patella, Michael [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=80e0ec6421924b588d3a02d7c8e1bc5e-Patella, Mi]; Nathan Gardner-Andrews (ngardner-andrews@nacwa.org) [ngardner-andrews@nacwa.org]; Grevatt, Peter [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d3caa0c39ebe44cb9d3ae44da7543733-Grevatt, Peter]; Shanaghan, Peter [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=63bb2a6ab300454dbd58e2d3b9084cca-pshanagh]; Stein, Raffael

[/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=280af9f00275496d96dc7587ab473480-Rstein]; Richard F. Anderson Ph.D. (randerson@usmayors.org) [randerson@usmayors.org]; Seth W. Miller Gabriel (Ex. 6 Ex. 6; Brubaker, Sonia [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=6055e643e5154f25b83a5515161e1705-sbruba02]; Susan Gilson (sgilson@carmengroup.com) [sgilson@carmengroup.com]; Tim Williams (TWilliams@wef.org) [TWilliams@wef.org]; Wall, Tom [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=128011ac603c4d1a82301ada1bdfd733-Twall]; Usha Rao-Monari (raomonari@globalwaterdev.com) [raomonari@globalwaterdev.com]; Blette, Veronica [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=acda7532589c4cc8a3d00f978953950c-Blette, Veronica]; Anderson, William [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=0411cf4ec84241e5a65a0845e98e1fc5-WAnder02]; PDannenfeldt@nacwa.org; Gebhardt, Jim [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d25752bcb8c741fd831dbc3429088987-Gebhardt, J]; Schollhamer, Mary [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=1f3d9cb938b74af5825edfbfd2e85abd-MSCHOLLH]; nstoner@piscesfoundation.org; Anderer, Kirsten [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=065ed70f5f8e4c49803b16363d4d0e00-Anderer, Kirsten]; Ex. 6 Lopez-Carbo, Maria [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=447508c93bb448e3924d1d90e474b446-Mcarbo]; Ex. 6 ; Ex. 6 RFox@uswateralliance.org; Piziali, Jamie [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=db3bc8d736794e969cf9c145e662bbfd-JPiziali]; Rubin, Howard E [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=58e3702459914f5c96ef771fa38e25cf-Rubin, Howard]; Covington, John [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=e3701c3d512c4a2495fa8be0b14b661e-Covington,]; schlea@amwa.net; Gutierrez, Sally [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=5a028e53f9c9437dbf25957863b4e13e-Gutierrez, Sally]; Steve Dye (sdye@nexusgr.com) [sdye@nexusgr.com]; svia@awwa.org [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=837e1d66b58a4ea99e240f18e13c4c86-svia@awwa.org]; Tommy Barnes (tommy.barnes@ky.gov) [tommy.barnes@ky.gov]; Nate Norris [NNorris@awwa.org]; KSurfus@nacwa.org; Wendi Wilkes [WWilkes@awwa.org]; sgarcia@APWA.NET; Vanessa@WWEMA.org; ken.maynard@earthandwatergroup.com; CHornback@nacwa.org; jasheehan@michaelbest.com; bwright@waterrf.org; psinicropi@watereuse.org; Adeines@werf.org; Adam Carpenter [acarpenter@awwa.org]; Farris, Erika D. [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=d37183fb40d3482187e8f179b5b85386-EFarris]

Subject: RE: Celebrate Spring Happy Hour with Water Colleagues - Correction! Sorry, Location was Missing!

Unfortunately, I will miss this event. Will be in Moorehead, MN at an AWWA section meeting. Enjoy!

Tracy

-----Original Appointment-----
From: Ex. 6 [mailto:Ex. 6]
Sent: Monday, April 23, 2018 10:00 PM
To: Brent Fewell; Kathryn Ruffalo; Freedman, Jon; Francesca McCann (McCannF@bv.com); Adam Krantz (akrantz@nacwa.org); Alex Beehler Ex. 6; Andrew Sawyers (Sawyers.Andrew@epa.gov); Benjamin H. Grumbles (ben.grumbles@maryland.gov); Bill Teichmiller (teich4@ejwatercoop.com); Brian T. Oakley (boakley@scullycapital.com); Brooks M. Smith (bsmith@hunton.com); Colleen Newman (Colleen@nawc.com); D. Lee Lee Forsgren (Forsgren.Lee@epa.gov); D. Randall Benn Ex. 6; Deborah G. G. Nagle (nagle.deborah@epa.gov); Debra G. Coy (debracoy@xpvwaterpartners.com); Diane VanDe Hei (vandehei@amwa.net); Eileen O'Neill (EONeill@wef.org); Ellen Tarquinio (Tarquinio.Ellen@epa.gov); Eric Burneson (Burneson.Eric@epamail.epa.gov); Eric Sapirstein (esap@ensresources.com); Erica Brown (brown@amwa.net); Erik J. Meyers (emeyers@conservationfund.org); Tracy Mehan; Gail Bingham (gbingham@resolv.org); George F. Ames (ames.george@epa.gov); George S. Hawkins Ex. 6; Gordon Binder (gordon.binder@wwfus.org); Grace Soderberg (grace@nawc.com); Gregory E. Peck (peck.gregory@epa.gov); Hank Habicht (Hank@SunToWater.com); Jeff Lape (lape.jeff@epa.gov); Joel C. Beauvais (joel.beauvais@lw.com); John Ryan (ryan.johnp@epa.gov); Jonathan R. Pawlow (Jon.Pawlow@mail.house.gov); Jordan Dorfman (dorfman.jordan@epa.gov); Julia Anastasio Esq. (janastasio@acwa-us.org); Julia Anastasio Esq. (janastasio@apwa.net); Kelly Tucker (Tucker.Kelly@epa.gov); Ken Maynard Ex. 6; Kenneth von Schaumburg (kvonschaumburg@clarkhill.com); Kristyn Abhold (abhold.kristyn@epa.gov); Larry J. Scully

(lscully@scullycapital.com); Lauren Campbell [Ex. 6]; Leslie Temple (temple.leslie@epa.gov); Marybeth Leongini (marybeth@nawc.com); Matthew Chiller (matthew.chiller@ch2m.com); Matthew Ries P.E. (mries@wef.org); Melissa L. Meeker (mmeeker@watereuse.org); Michael Curley (mc@envfin.com); Michael N. Arceneaux (arceneaux@amwa.net); Michael Patella (patella.michael@epa.gov); Nathan Gardner-Andrews (ngardner-andrews@nacwa.org); Peter C. Grevatt Ph.D (grevatt.peter@epa.gov); Peter E. Shanaghan (shanaghan.peter@epa.gov); Raffael Stein (Stein.raffael@Epa.gov); Richard F. Anderson Ph.D. (randerson@usmayors.org); Seth W. Miller Gabriel ([Ex. 6]); Brubaker, Sonia; Susan Gilson (sgilson@carmengroup.com); Tim Williams (TWilliams@wef.org); Tom Wall (wall.tom@epa.gov); Usha Rao-Monari (raomonari@globalwaterdev.com); Veronica Blette (Blette.Veronica@epa.gov); William Anderson (Anderson.William@epa.gov); PDannenfeldt@nacwa.org; Gebhardt.Jim@epa.gov; Schollhamer.Mary@epa.gov; nstoner@piscesfoundation.org; Anderer.Kirsten@epa.gov; [Ex. 6] Lopez-Carbo.Maria@epa.gov; [Personal Privacy / Ex. 6]; [Ex. 6] RFox@uswateralliance.org; Piziali.Jamie@epa.gov; Rubin.HowardE@epa.gov; covington.john@epa.gov; schlea@amwa.net; Gutierrez, Sally; Steve Dye (sdye@nexusgr.com); Steve Via; Tommy Barnes (tommy.barnes@ky.gov); Nate Norris; KSurfus@nacwa.org; Wendi Wilkes; sgarcia@APWA.NET; Vanessa@WWEMA.org; ken.maynard@earthandwatergroup.com; CHornback@nacwa.org; jasheehan@michaelbest.com; bwright@waterrf.org; psinicropi@watereuse.org; Adeines@werf.org; Adam Carpenter; 'Farris, Erika D.'
Subject: Celebrate Spring Happy Hour with Water Colleagues - Correction! Sorry, Location was Missing!
When: Tuesday, May 01, 2018 5:00 PM-8:00 PM (UTC-05:00) Eastern Time (US & Canada).
Where: "Proper 21" at 1319 F Street, NW, Washington, DC 2004

The last time we brought the broad Washington Water World together for happy hour was in December to enjoy some holiday cheer. Now that Spring has decided to arrive in Washington, let's gather again! Please share with colleagues as I am sure I missed many scrolling through contacts - the more the merrier, of course.

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Dedicated to the World's Most Important Resource ®

Message

From: Duncan, Deidre [dduncan@hunton.com]
Sent: 3/23/2018 7:07:59 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
CC: Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]; Campbell, Ann [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b8c25a0c2fb648b6a947694a8492311e-Campbell, Ann]; Drinkard, Andrea [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=808a6b7b65bf447f93dad2f510feaf61-ADRINKAR]
Subject: RE: Invitation to Speak at the Energy Bar Association's Annual Conference 5/7

Great! Thanks, Lee.
Deidre

From: Forsgren, Lee [mailto:Forsgren.Lee@epa.gov]
Sent: Friday, March 23, 2018 2:31 PM
To: Duncan, Deidre
Cc: Penman, Crystal; Campbell, Ann; Drinkard, Andrea
Subject: Re: Invitation to Speak at the Energy Bar Association's Annual Conference 5/7

Deidra
Let me look at the calendar and see what might be possible.

Lee,

Sent from my iPhone

On Mar 23, 2018, at 1:33 PM, Duncan, Deidre <dduncan@hunton.com> wrote:

> Lee,
> Hope you are doing well! Quick question. Would you be available to speak at the Energy Bar Association's Annual Conference on the various 401-related issues surrounding energy development. The panel is currently scheduled for 3:45-5:00 on May 7. I will be moderating the panel, and we are hoping to have a FERC, EPA, and Corps representative. I would greatly appreciate your participation. Let me know if you are available. Thanks.
> Deidre

<image001.jpg>

Deidre G. Duncan
Partner
dduncan@hunton.com
p Ex. 6

bio | vCard

Hunton & Williams LLP
2200 Pennsylvania Avenue, NW
Washington, DC 20037
hunton.com

Message

From: Baer, Louis [LBaer@cement.org]
Sent: 5/23/2018 4:44:56 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
CC: Mayer, Lauren [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=7e806d6189b44868a53ff4bdce1af43e-Mayer, Laur]; Campbell, Ann [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b8c25a0c2fb648b6a947694a8492311e-Campbell, Ann]; Franklin, Charles [CFranklin@cement.org]; Reiner, Josh [JReiner@cement.org]; Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]
Subject: RE: PCA Meeting Request with Office of Water

Thank you Lee for the very quick response. We look forward to hearing back from you and your staff as to potential meeting times during the week of July 23.

Best,
Louis

Louis A. Baer, Esq., CPEA
Director/Assistant Counsel, Government Affairs
Portland Cement Association
1150 Connecticut Avenue NW, Suite 500

Ex. 6

lbaer@cement.org
www.cement.org

From: Forsgren, Lee [mailto:Forsgren.Lee@epa.gov]
Sent: Wednesday, May 23, 2018 12:37 PM
To: Baer, Louis <LBaer@cement.org>
Cc: Mayer, Lauren <mayer.lauren@epa.gov>; Campbell, Ann <Campbell.Ann@epa.gov>; Franklin, Charles <CFranklin@cement.org>; Reiner, Josh <JReiner@cement.org>; Penman, Crystal <Penman.Crystal@epa.gov>
Subject: RE: PCA Meeting Request with Office of Water

Louis,

Unfortunately I will be out of the country on July 11th and 12th and I don't know what Mr. Ross's schedule is for those dates. Crystal Penman will see what the art of the possible might be for the week of July 23rd.

Regards,
Lee

D. Lee Forsgren
Deputy Assistant Administrator
Office Of Water
Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Room 3219 WJCE
Washington, DC 20460
Phone: 202-564-5700

Forsgren.Lee@epa.gov

From: Baer, Louis [mailto:LBaer@cement.org]
Sent: Wednesday, May 23, 2018 12:32 PM
To: Forsgren, Lee <Forsgren.Lee@epa.gov>
Cc: Mayer, Lauren <mayer.lauren@epa.gov>; Campbell, Ann <Campbell.Ann@epa.gov>; Franklin, Charles <CFranklin@cement.org>; Reiner, Josh <JReiner@cement.org>
Subject: PCA Meeting Request with Office of Water

Lee,

I hope you are doing well. It was very much a pleasure seeing you and meeting Matt Leopold at the meeting with the U.S. Chamber of Commerce to discuss the Surface Water Discharge via Groundwater issue.

We wanted to follow up with you in our conversations about scheduling a meeting with you and Assistant Administrator David Ross to introduce both of you to the PCA Government Affairs Team and PCA member leaders and to discuss the Waters of the U.S. Rule, Surface Water Discharges Via Groundwater, and other water issues affecting the cement industry. Would you and Mr. Ross be available to meet on either Wednesday, July 11 or Thursday, July 12? If you are not available for those dates, perhaps we can look at the week of July 23.

Thank you very much for your time. We look forward to hearing from you.

Best,
Louis

Louis A. Baer, Esq., CPEA
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1150 Connecticut Avenue NW, Suite 500

Ex. 6

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Message

From: Duncan, Deidre [dduncan@hunton.com]
Sent: 3/23/2018 5:33:03 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
CC: Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]
Subject: Invitation to Speak at the Energy Bar Association's Annual Conference 5/7

Lee,
Hope you are doing well! Quick question. Would you be available to speak at the Energy Bar Association's Annual Conference on the various 401-related issues surrounding energy development. The panel is currently scheduled for 3:45-5:00 on May 7. I will be moderating the panel, and we are hoping to have a FERC, EPA, and Corps representative. I would greatly appreciate your participation. Let me know if you are available. Thanks.
Deidre

HUNTON& WILLIAMS

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Partner
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Message

From: Jeff Gunnulfsen [JGunnulfsen@afpm.org]
Sent: 2/21/2018 8:35:02 PM
To: Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]
CC: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; David Friedman [DFriedman@afpm.org]
Subject: AFPM Mtg this Friday --Agenda
Attachments: OW AA Ross Agenda.docx

Importance: High

Crystal-
Please find attached our suggested agenda for Friday's meeting—just to keep us on schedule. Please send me the building address & entrance and number to call when we get there. Thanks and see you on Friday!

Director
Security & Risk Management Issues
AFPM
Suite 700
1667 K St., NW
Washington, DC 20006
Ex. 6
Email: jgunnulfsen@afpm.org

AFPM meeting with OW AA David Ross

Feb. 23, 2018, 10:00 AM EST

I.	**Introductions**	**All**
II.	**OW Priorities**	**EPA**
III.	**AFPM Spring Environmental Committee Meeting**	**David Freidman (AFPM)**
IV.	**AFPM/API Water Issues**	**AFPM/API**
	-WOTUS	
	-Refinery ELG	

Message

From: Roger Claff [Claff@api.org]
Sent: 2/26/2018 7:22:23 PM
To: Ross, David P [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=119cd8b52dd14305a84863124ad6d8a6-Ross, David]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
CC: Jeff Gunnulfsen (JGunnulfsen@afpm.org) [JGunnulfsen@afpm.org]; Jeff Longsworth [jeffrey.longsworth@btlaw.com]
Subject: FW: Refining Effluent Guidelines Detailed Study with EPA - Meeting Concerning Refinery Self-Monitoring Program
Attachments: refining_elg_meeting_with_epa_012518.pdf

Importance: High

David and Lee,

Thank you so much for meeting with us on Friday to discuss Waters of the U. S. and the Petroleum Refining Effluent Guidelines Detailed Study. As requested, the attached is the presentation we gave to your effluent guidelines staff at a January 25 meeting to discuss the refinery self-monitoring program, including schedule/timing and including our concerns about sample collection and analysis for two classes of chemical compounds (naphthenic acids and alkylated PAHs). Below is a summary of the meeting we prepared and sent to your staff.

Please do contact either of us any time to discuss our concerns further or if there are any questions we can answer. Thank you again for your time.

Roger E. Claff, P.E.
Senior Scientific Advisor
API
1220 L Street Northwest
Washington, DC 20005
Ex. 6
(202) 682-8270 (FAX)
claff@api.org
www.api.org



Jeff Gunnulfsen
Director
Security & Risk Management Issues
AFPM
Suite 700
1667 K St., NW
Washington, DC 20006
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Email: jgunnulfsen@afpm.org

From: Roger Claff
Sent: Monday, February 26, 2018 11:22 AM
To: Damico.brian@Epa.gov
Cc: Jeff Gunnulfsen (JGunnulfsen@afpm.org); Jeff Longsworth
Subject: FW: Refining Effluent Guidelines Detailed Study with EPA - Meeting Concerning Refinery Self-Monitoring Program
Importance: High

Brian,

Attached for your reference is the presentation from our meeting with you and your staff on January 25, to accompany the meeting summary previously sent (below). Please keep us apprised as to when we might receive from you the materials concerning naphthenic acids/alkylated PAHs analytical methods, validation, QA/QC, etc. We appreciate your efforts to provide us this information so we might better understand this part of the proposed refinery self-monitoring program. Also, any information you could provide as to the anticipated schedule for the refinery self-monitoring program (refinery selection, site-specific sampling and analysis plans, refinery sample collection, etc.) and/or for the overall progress of the detailed study as a whole would be greatly appreciated.

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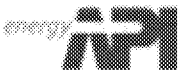
claff@api.org
www.api.org



From: Roger Claff
Sent: Thursday, February 08, 2018 1:11 PM
To: Damico.brian@Epa.gov
Cc: 'Wood.robert@Epa.gov'; 'lewis.samantha@epa.gov'; 'flanders.phillip@epa.gov'; 'hanley.adrian@epa.gov'; 'danielle.lewis@erg.com'; Jeff Gunnulfsen (JGunnulfsen@afpm.org)
Subject: Refining Effluent Guidelines Detailed Study with EPA - Meeting Concerning Refinery Self-Monitoring Program
Importance: High

Brian,

Thank you for meeting with API and AFPM members on Thursday, January 25, to discuss the petroleum refining effluent guidelines detailed study. API and AFPM appreciate the on-going collaborative effort with your staff to shape the study to ensure it will provide to EPA the appropriate high quality data the agency requires to make sound technical decisions concerning the refining effluent guidelines. The following is a summary of our conversation, stated plans for on-going dialogue, and promised action items.

API/AFPM has been working collaboratively with EPA since our first meeting back in 2016. Ten refinery site visits have been conducted, at which wastewater streams, treatment operations, and possible sampling locations were identified. The 308 survey was collaboratively refined, clarified, and strengthened. API/AFPM looks forward to continued collaboration with EPA as we move into the detailed study's refinery self-monitoring program.

API/AFPM noted that refineries are highly variable and complex facilities, incorporating various crude oil chemical reaction steps and distillation processes to produce a wide spectrum of petroleum products, with routine operation modifications occurring in response to market forces. Each and every refinery is unique in its operations and its wastewater handling and treatment practices. The petroleum refining industry's performance in complying with NPDES requirements is exemplary among NPDES-regulated dischargers.

API/AFPM noted a number of sampling and analytical topics not addressed in the current version of the generic sampling plan for the self-monitoring program. We all agreed that the best place to address these concerns is in the refinery-specific sampling plans. These topics are:

- Representative Sample Collection – API/AFPM and EPA both support representative sampling. Due to the fact that refineries are unique and complex, there may be differences in sample collection methodology (grab vs composite) from site to site.
- Phase Separation - We all agreed to analyze only the aqueous phase of any sample that may exhibit two or more phases. Industry requests that EPA provide specific procedures for sample management when two or more phases are present.
- Blanks – The appropriate blanks will be specified in the refinery-specific sampling plans.
- Preservation Guidelines – Appropriate sample preservation guidelines will be specified in the refinery-specific sampling plans.
- Analytical Methods – Analytical methods will be specified in the refinery-specific sampling plans. Methods will be those published in 40 CFR 136 that meet or exceed the sensitivity of those methods listed in the Generic SAP, Table 4-1.

API/AFPM shared multiple concerns regarding the inclusion of naphthenic acids and alkylated PAHs in the detailed study. These concerns include:

- Use of a non-40 CFR 136-approved method
- Use of a proprietary method
- Naphthenic acids and alkylated PAHs are method-defined analytes
- Limited quantitative capability and uncertain data quality
- Lack of toxicity data for decision-making

API/AFPM presented these technical concerns to EPA and requested that naphthenic acids and alkylated PAHs be removed from the self-monitoring program. EPA has yet to agree to their removal from the effluent guidelines detailed study. API/AFPM believes that if EPA has a solid technical basis to study these compound classes, it should be in an effort *separate and independent* from the ELG detailed study. Any new analytical method development for these compound classes should follow the process of public notice and comment for approval before the method is used to generate data for regulatory or legislative purposes. API/AFPM welcomes continued discussion and resolution of this matter.

Thank you for agreeing to provide additional data behind the method for alkylated PAHs and the proprietary method for naphthenic acids. This information includes, but is not limited to, QA/QC data and detailed procedures behind your contract laboratory's emerging analytical method and variations thereof. API/AFPM hopes this information may be provided by the end of next week so we might begin review of it in a timely fashion.

Thank you also for agreeing to reject non-detect data with unknown or high MDL/MLs. We look forward to future discussions, *prior to publication*, of the refinery-specific sampling program, data review, results, findings and conclusions. API/AFPM and EPA all want to ensure that estimates such as J-flag values and half detection values do not

skew data interpretation, potentially leading to inaccurate conclusions about refinery wastewaters. API/AFPM still has concerns about EPA's proposed use of gray literature and ad-hoc data.

We would appreciate your concurrence with the above synopsis of our meeting and look forward to soon receiving the list of refineries identified for self-sampling. As discussed, the facility's input into the agency's site-specific plans for each unique refinery is essential for representative sampling results. Subsequent collaboration will finalize the sampling program and associated timelines to accommodate industry variables such as budgeting, resourcing, maintenance schedules, turnarounds, and union contract negotiations.

We look forward to continuing the collaborative effort between EPA, API/AFPM, and API/AFPM member companies.

Roger E. Claff, P.E.
Senior Scientific Advisor
API
1220 L Street Northwest
Washington, DC 20005
Ex. 6
(202) 682-8270 (FAX)
claff@api.org
www.api.org



Sierra Club v. EPA 18cv3472 NDCA

Tier 1

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energy API

AFPM
American
Fuel & Petrochemical
Manufacturers

Petroleum Refining ELG Sampling Plan and QAPP

Washington, D.C.
January 2018

Sierra Club v. EPA 18cv3472 NDCA

Tier 1

ED_002061_00096619-00002

Agenda

energy API AFPM American Fuel & Petrochemical Manufacturers

- Agency and industry collaboration
- Refineries are highly variable and complex
- Site sampling and data collection
- Generic Sampling Plan
- Removal of PAHs and naphthenic acids
- Quality Assurance Project Plan (QAPP)
- Key takeaways and conclusion

Sierra Club v. EPA 18cv3472 NDCA

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ED_002061_00096619-00003

EPA and industry trades

Collaboration through the years

energy API AFPM American Fuel & Petrochemical Manufacturers



- 1st refinery ELG meeting with EPA was May 26, 2016
- Working together, we have:
  - Improved 308 survey clarity and quality
  - Strengthened agency's understanding of refining operations through presentations and site visits
- Need to resolve remaining issues with generic sampling plan and quality assurance project plan (QAPP)

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Tier 1

ED_002061_00096619-00004

Refineries are highly variable

energy API

AFPM
American
Fuel & Petrochemical
Manufacturers

WHY do they vary?

Age and evolution: retrofitting, process improvements

Crude availability, slate

Local and/or state fuel standards

Market size and competition

Product mix

Regulations

Transportation options

HOW do they vary?

Level of facility integration: highly integrated vs. independent

Physical size

Production capacity

Different processing technologies and configuration

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Tier 1

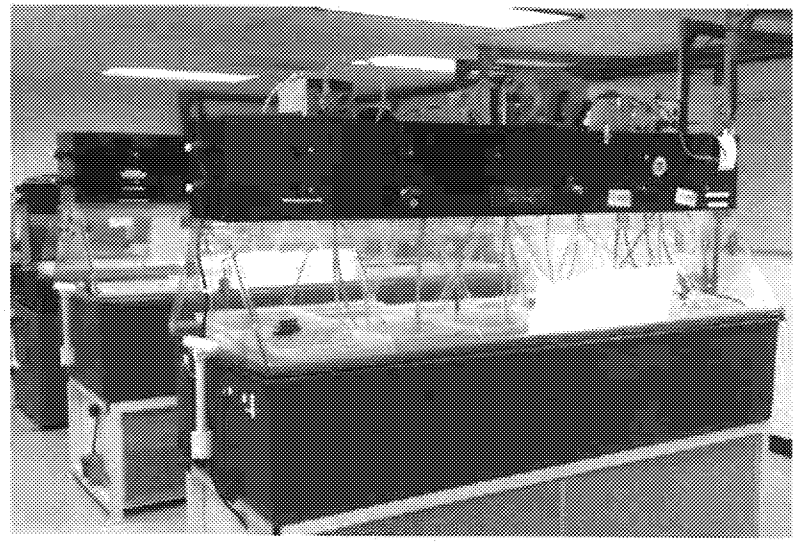
Refinery tours

AFPM
American
Fuel & Petrochemical
Manufacturers

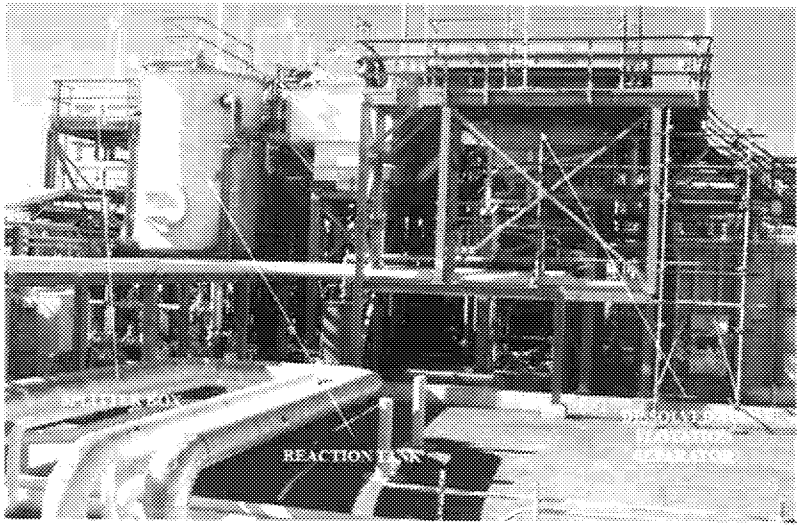
Treatment technologies are complex, diverse and site-specific



constructed wetlands



fish lab



selenium treatment plant



Lamella filters

ED_002061_00096619-00005

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Tier 1

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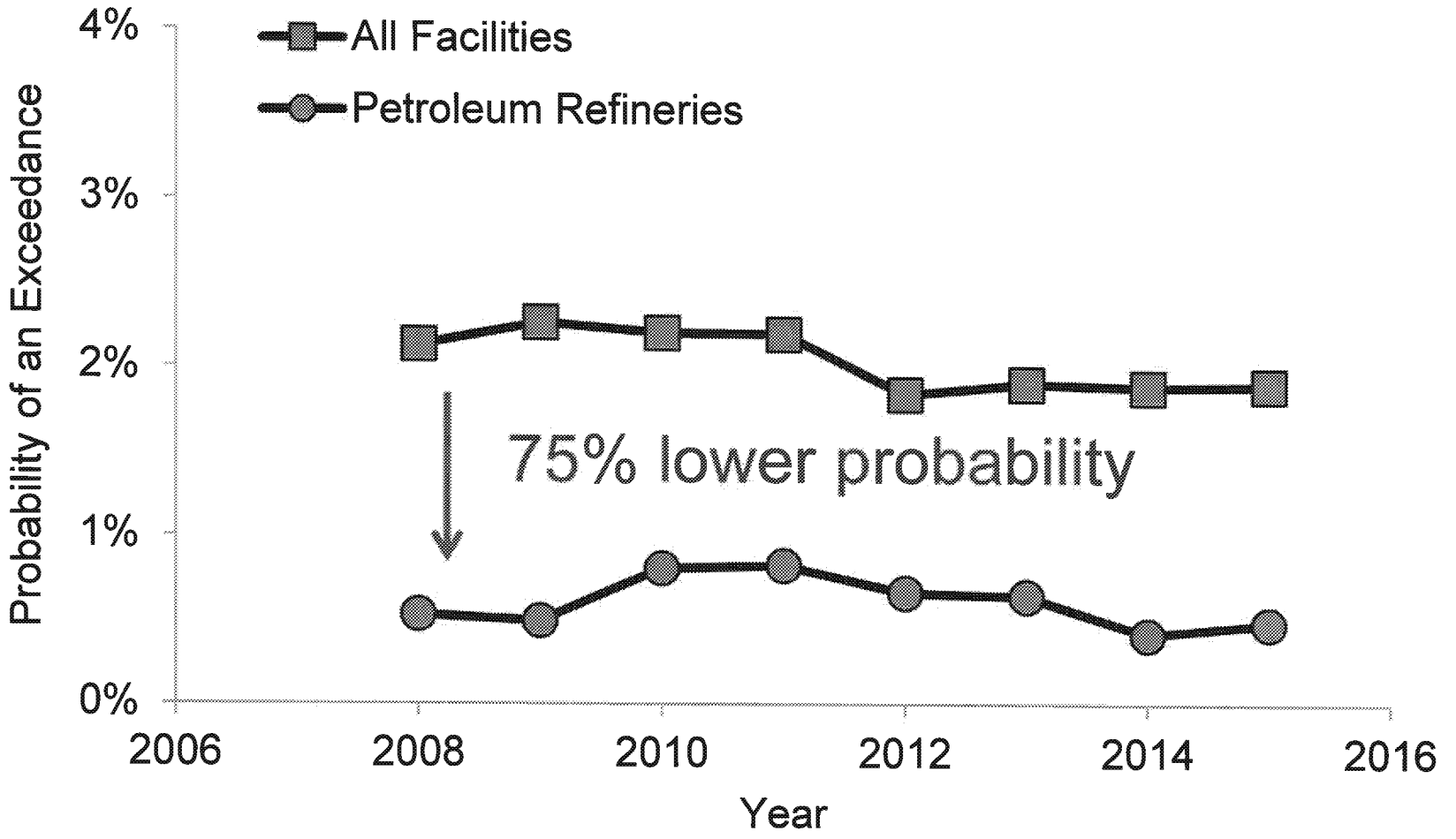
NPDES performance

Refineries have leading compliance

energy API AFPM American Fuel & Petrochemical Manufacturers



Source: ICIS-NPDES database; echo.epa.gov

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Tier 1

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General Sampling Plan

energy API

AFPM
American Fuel & Petrochemical Manufacturers

- Timing and site selection

- General Sampling Plan must allow refineries to provide clarity and/or consistency on:

Sampling requirements	Preservation guidelines	Analysis
a) Grab vs. composite	a) Residence times	a) 40 CFR 136 methods only
b) Address phase separation	b) Protocols	b) Method of choice for each analyte
c) Field and instrument blanks	c) Direct measurements for physical parameters (e.g., temperature, pH)	c) Handling on-site vs off-site analysis

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Tier 1

ED_002061_00096619-00008

Remove Alkylated PAH and Naphthenic Acids from sampling

energy API

AFPM
American Fuel & Petrochemical Manufacturers

- Limited quantitative capability
  - Phase separation and extraction procedures
  - Interferences in refinery wastewaters
- Absence of alkylated PAH speciation results in toxicity variability
  - Toxic weighting factors do not exist
- Any new method must follow normal regulatory process of public notice and comment for approval
  - Lack of independent verification
  - Unknown instrumentation bias and calibration procedures
- Industry is a willing participant in development of new methods that are scientifically sound, reliable, and promote quality decision-making
- Volatile, semi-volatile list sufficiently supports ELG decision-making

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ED_002061_00096619-00009

QAPP concerns

energy API AFPM American Fuel & Petrochemical Manufacturers

- Reject non-detect data with unknown or high MDL/ML
  - Approved EPA methods should be reported
  - Identify exceptions to non EPA methods
- Do not use J-flag values
- Do not use ad-hoc data
- Do not use gray literature
- Clarify timeframe for data acceptability
- EPA should have final authority for QA tests

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Site sampling study

energy API
AFPM
American
Fuel & Petrochemical
Manufacturers

- Refineries need to address characteristics of high quality data:
  - representative
  - number of samples
  - uses approved EPA collection and analytical methods
- What are EPA's data quality requirements?
- Estimates may be allowed for:
  - flow
  - pH
  - temperature
- Additional data provided by refineries?
- Audits of sampling events
  - random audit procedures
  - advance notice preferred
- Delays of results from third-party labs
- Agree site specific plans must include specific analyte list and EPA-approved methods

Tier 1

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Site Selection Considerations



- Which refineries will be required to self-monitor?
- Criteria?
- Status of site-specific sampling plans?
- Industry considerations and concerns:
  - Budget and resources
  - Preparation and planning
  - Refinery turnarounds
  - Process operations and safety considerations

Tier 1

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Tier 1

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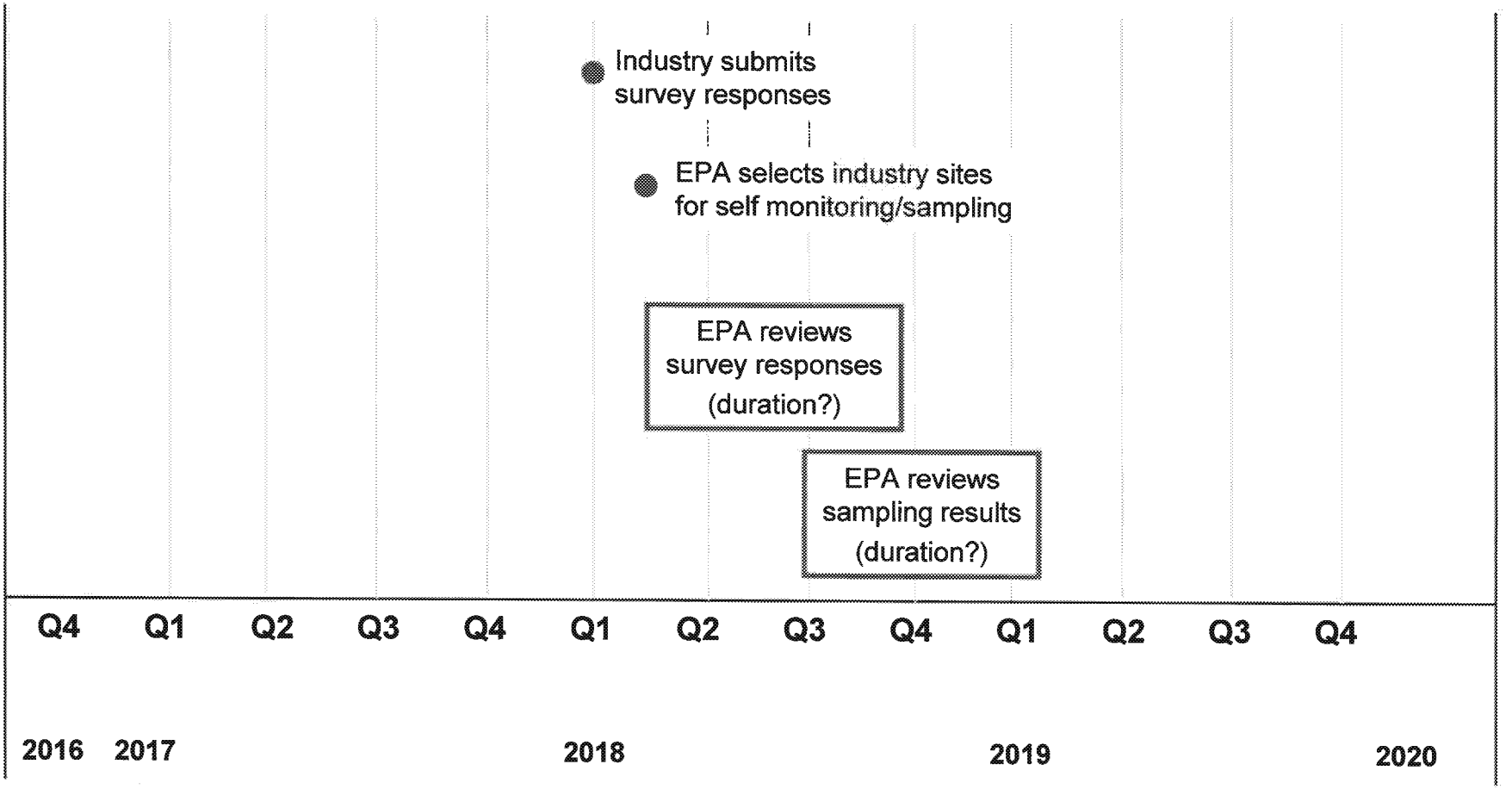
Understand 308 schedule

energy API AFPM American Fuel & Petrochemical Manufacturers



When will EPA make the ELG determination?

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Key Takeaways

energy API

AFPM
American
Fuel & Petrochemical
Manufacturers

- Incorporate changes to general sampling plan
- Remove alkylated PAH and naphthenic acids from analysis
- Address QAPP concerns
- Finalize schedule and sites for the sampling study
- Continued collaboration



Tier 1

ED_002061_00096619-00013

Questions?

AFPM
American Fuel & Petrochemical Manufacturers



Sierra Club v. EPA 18cv3472 NDCA Tier 1 ED_002061_00096619-00014

Message

From: Jeff Gunnulfsen [JGunnulfsen@afpm.org]
Sent: 2/14/2018 4:33:19 PM
To: Ross, David P [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=119cd8b52dd14305a84863124ad6d8a6-Ross, David]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: RE: Meeting with AFPM

Hi David and Lee-
Just want to confirm our meeting is still on. Please let me know we are still on for Feb. 23rd at 10 am. Thanks—look forward to meeting!

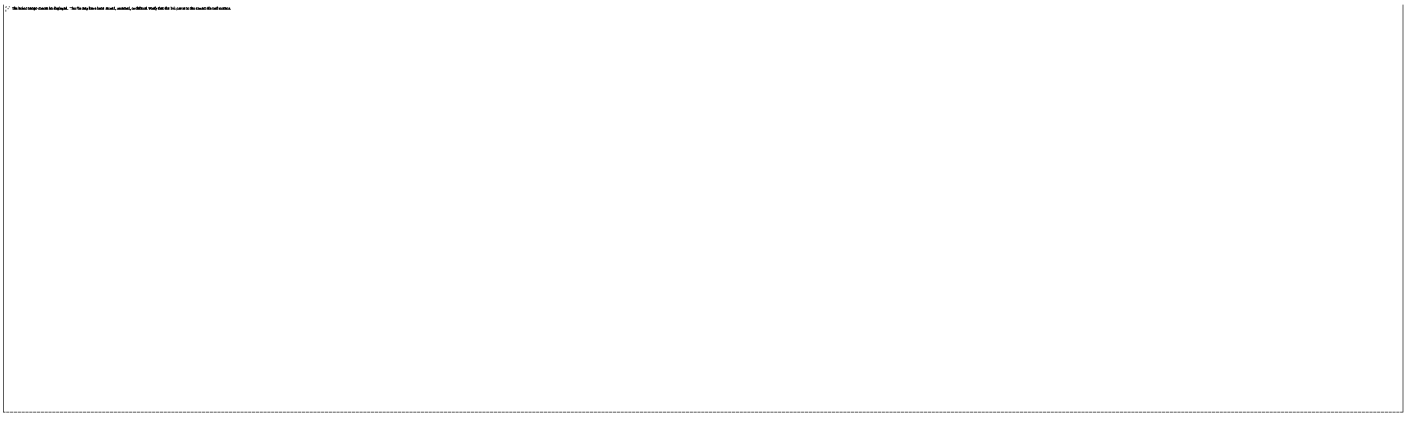
From: Jeff Gunnulfsen
Sent: Friday, February 9, 2018 1:37 AM
To: 'Ross, David P' <ross.davidp@epa.gov>
Subject: RE: Meeting with AFPM
Importance: High

Hi David—
Just want to confirm our meeting is still on for the 23rd at 10 AM. It will be me and probably 6 or 7 others (my boss and members). If that is too many please let me know and we can cut that down. Just curious but who would be there from EPA? Looking forward to the meeting—I'll send a list of attendees as we get closer to the meeting. Thanks again for taking time out of your busy schedule to meet!

-----Original Appointment-----
From: Ross, David P [mailto:ross.davidp@epa.gov]
Sent: Monday, January 29, 2018 3:46 PM
To: Ross, David P; Campbell, Ann; Jeff Gunnulfsen
Subject: Meeting with AFPM
When: Friday, February 23, 2018 10:00 AM-10:30 AM (UTC-05:00) Eastern Time (US & Canada).
Where: 1201 Constitution Ave NW, Washington DC 20460 WJCE 3233 Please call 202-564-5700 for escort

Message

From: Jack Gerard [registrar@api.org]
Sent: 1/9/2018 5:33:22 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: Watch Live: API's State of American Energy 2018



STATE OF AMERICAN ENERGY 2018 | HOW NATURAL GAS & OIL ARE POWERING PAST IMPOSSIBLE

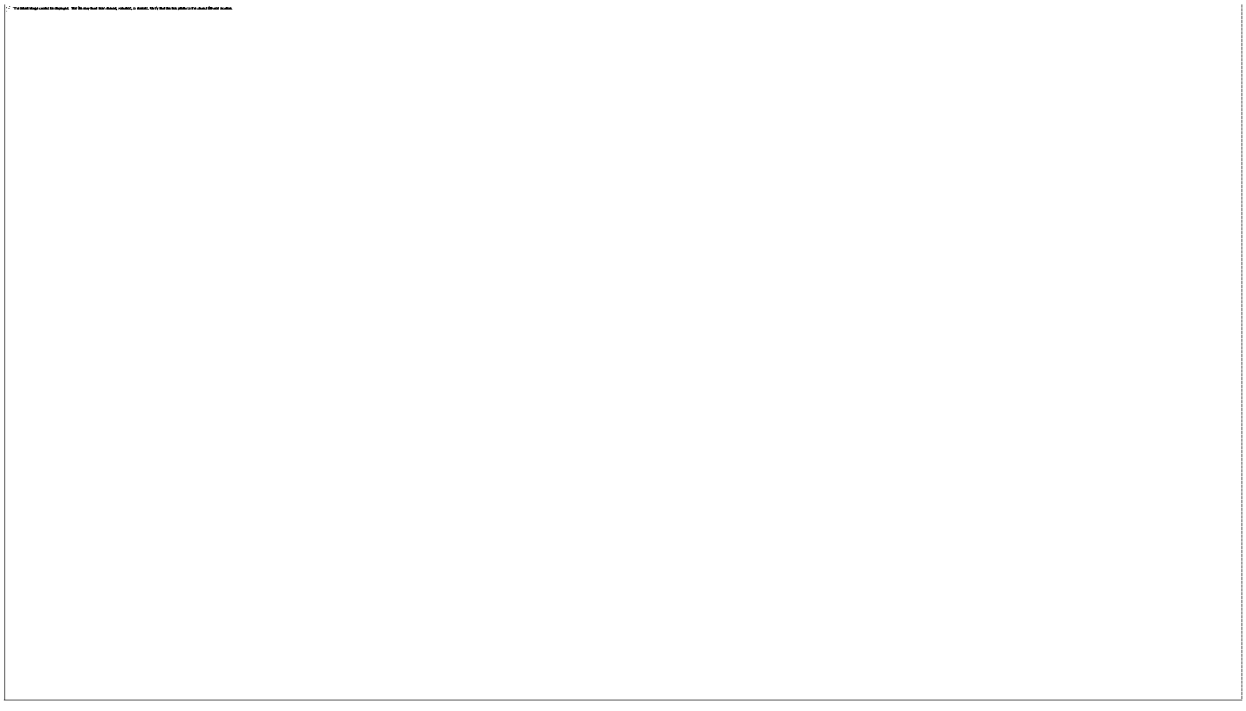
Watch Live: The State of American Energy





If you were unable to attend API's State of American Energy 2018 event today, you don't have to miss it! Simply watch the event live.

We encourage you to join the conversation on Twitter using #SOAE2018.





This event has been designed to comply with the gifts and ethics rules of the U.S. Senate and House of Representatives as a "widely attended event." Employees of the executive branch may wish to consult their Designated Agency Ethics Official about any rules that may apply to their attendance at this event.



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Message

From: Duncan, Deidre [dduncan@hunton.com]
Sent: 12/2/2017 1:27:30 PM
To: Brown, Samuel L. [SlBrown@hunton.com]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: RE: Thank you!

Yes, Lee. Thanks so much for coming. It is always a pleasure to hear you speak! Have a great weekend.
Deidre

From: Brown, Samuel L.
Sent: Saturday, December 02, 2017 3:09 AM
To: forsgren.lee@epa.gov
Cc: Duncan, Deidre
Subject: Thank you!

Hi Lee,

I just want to thank you again for participating in our *Insights into Environmental Law & Policy: A Conversation with Key Regulators* event on Thursday. We received great feedback from the participants and your contribution was greatly appreciated.

Thanks! – Sam

HUNTON& WILLIAMS

Samuel Brown
Senior Attorney
slbrown@hunton.com
Ex. 6
f 415.975.3775
bio | vCard

Hunton & Williams LLP
50 California Street
Suite 1700
San Francisco, CA 94105
hunton.com

Message

From: Jeff Gunnulfsen [JGunnulfsen@afpm.org]
Sent: 1/16/2018 3:51:19 PM
To: Ross, David P [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=119cd8b52dd14305a84863124ad6d8a6-Ross, David]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: RE: Meet with AFPM

Importance: High

All—
Just want to follow up on my email from the 10th. Please let us know of some possible dates for a meeting at your convenience—thank you!

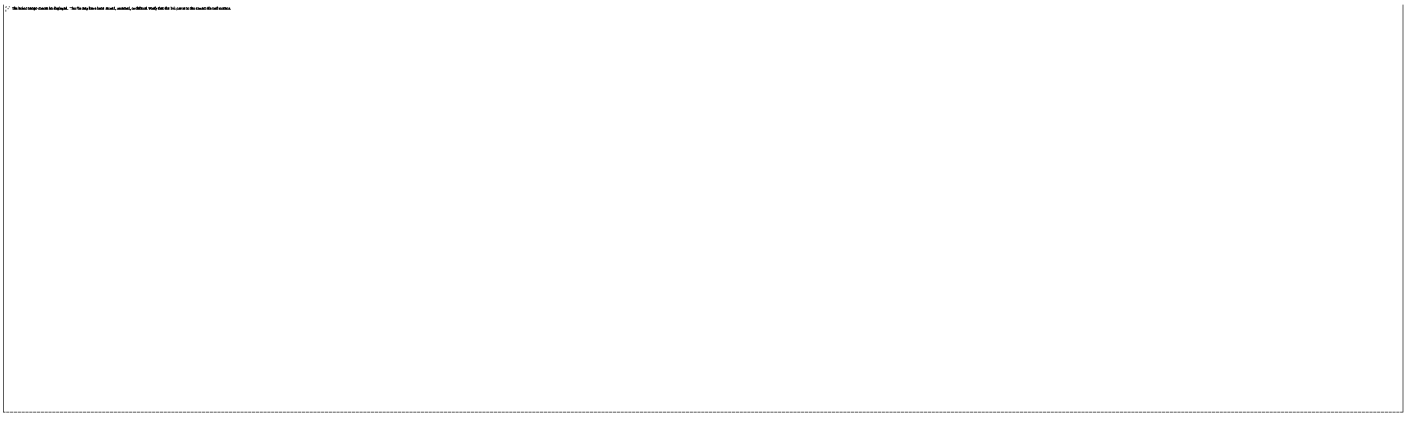
From: Jeff Gunnulfsen
Sent: Wednesday, January 10, 2018 12:21 PM
To: 'ross.davidp@epa.gov' <ross.davidp@epa.gov>
Subject: Meet with AFPM
Importance: High

Hi Assistant Administrator Ross—
Welcome to Washington and congratulations on leading the water office. I work for the American Fuels and Petrochemical Manufacturers (AFPM) and we wanted to schedule a meeting with you to introduce you to us, our issues, and working together in the future. The water issues of main interest to our members right now are the Refinery Effluent Guidelines and Waters of the U.S. We know you have a very busy schedule so we wanted to reach out now to secure a meeting on your calendar. We had some previous interaction with Lee Forsgren during the hurricanes and it would be great if he could attend the meeting as well. We look forward to your response and working together. Thanks!

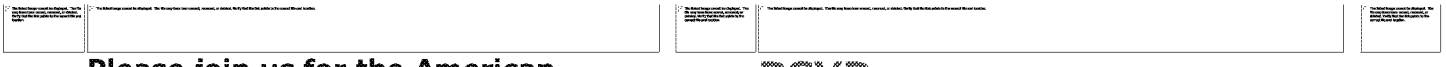
Director
Security & Risk Management Issues
AFPM
Suite 700
1667 K St., NW
Washington, DC 20006
Ex. 6
Email: jgunnulfsen@afpm.org

Message

From: Jack Gerard [registrar@api.org]
Sent: 11/29/2017 3:32:24 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: You're Invited to API's State of American Energy 2018



STATE OF AMERICAN ENERGY 2018 | HOW NATURAL GAS & OIL ARE POWERING PAST IMPOSSIBLE



Please join us for the American Petroleum Institute's 2018 State of American Energy luncheon. As the midterm election year begins we will remind lawmakers, policymakers and the public that America's domestic energy abundance is helping to meet the ever-growing demand for energy, but also how those same resources are the building blocks for many of the products that make our modern society safer, advance the medical arts, and spur creativity and scientific innovation through our Power Past Impossible advertising campaign.

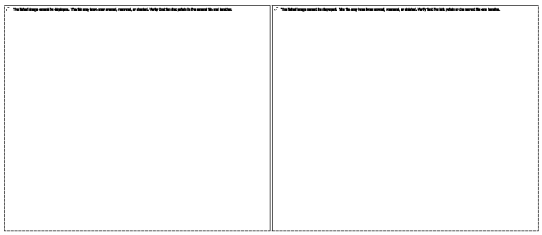
From energy that keeps our homes, offices, and schools lit and warm, to the modern fuels that not only power our vehicles but also help to improve our environment, to the modern pharmaceuticals that improve the health and well-being of millions. Power Past Impossible makes the connection between natural gas, oil and their derived products and their fundamental role in our society, which is essential to positively advance the national energy policy discussion.

Sincerely,

RSVP

BY DECEMBER 22ND

This invitation is non-transferable.



When

TUESDAY, JANUARY 9, 2018
11:30 A.M.-1:00 P.M.

Where

Ronald Reagan Building and
International Trade Center
Atrium Ballroom
1300 Pennsylvania Avenue, NW
Washington, DC 20004

Please use entrance on 14th Street

JACK N. GERARD
President and CEO, API

This event has been designed to comply with the gifts and ethics rules of the U.S. Senate and House of Representatives as a "widely attended event." Employees of the executive branch may wish to consult their Designated Agency Ethics Official about any rules that may apply to their attendance at this event.

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Message

From: Greenwalt, Sarah [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=6C13775B8F424E90802669B87B135024-GREENWALT,]
Sent: 11/28/2017 8:39:03 PM
To: Ghanta, Venu G [Venu.Ghanta@duke-energy.com]
CC: Washington, Valerie [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9d031c02ce3a416dad0d421ee998d5a3-VWASHING]; Fotouhi, David [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=febaf0d56aab43f8a9174b18218c1182-Fotouhi, Da]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: RE: Edwardsport and Pruitt meeting

That is fine.

Valerie, can you please add this call-in number to the appointment?

Sarah A. Greenwalt
Senior Advisor to the Administrator
for Water and Cross-Cutting Issues

U.S. Environmental Protection Agency
Work: 202-564-1722 | Ex. 6
Greenwalt.Sarah@epa.gov

From: Ghanta, Venu G [mailto:Venu.Ghanta@duke-energy.com]
Sent: Tuesday, November 28, 2017 2:53 PM
To: Greenwalt, Sarah <greenwalt.sarah@epa.gov>
Cc: Washington, Valerie <Washington.Valerie@epa.gov>; Fotouhi, David <Fotouhi.David@epa.gov>; Forsgren, Lee <Forsgren.Lee@epa.gov>
Subject: RE: Edwardsport and Pruitt meeting

I also should add a few folks from my end as well. Would you be okay with calling in to our conference line? Ex. 6
Ex. 6

From: Greenwalt, Sarah [mailto:greenwalt.sarah@epa.gov]
Sent: Tuesday, November 28, 2017 2:11 PM
To: Ghanta, Venu G
Cc: Washington, Valerie; Fotouhi, David; Forsgren, Lee
Subject: RE: Edwardsport and Pruitt meeting

Why don't you call my cell, highlighted below. I've invited our political deputy in OW, Lee Forsgren, to join us if he can.

Sarah A. Greenwalt
Senior Advisor to the Administrator
for Water and Cross-Cutting Issues

U.S. Environmental Protection Agency
Work: 202-564-1722 | Ex. 6
Greenwalt.Sarah@epa.gov

From: Ghanta, Venu G [mailto:Venu.Ghanta@duke-energy.com]
Sent: Tuesday, November 28, 2017 11:11 AM
To: Greenwalt, Sarah <greenwalt.sarah@epa.gov>
Cc: Washington, Valerie <Washington.Valerie@epa.gov>; Fotouhi, David <Fotouhi.David@epa.gov>
Subject: Re: Edwardsport and Pruitt meeting

Yes, that should work well. Shall I call you or do you want to call me?

On Nov 28, 2017, at 10:34 AM, Greenwalt, Sarah <greenwalt.sarah@epa.gov> wrote:

> Could we do 9:00? David Fotouhi will be on the call as well.
>
> **Sarah A. Greenwalt**
> Senior Advisor to the Administrator
> for Water and Cross-Cutting Issues
>
> U.S. Environmental Protection Agency
> Work: 202-564-1722 | Ex. 6
> Greenwalt.Sarah@epa.gov

From: Ghanta, Venu G [mailto:Venu.Ghanta@duke-energy.com]
Sent: Tuesday, November 28, 2017 10:01 AM
To: Greenwalt, Sarah <greenwalt.sarah@epa.gov>; Washington, Valerie <Washington.Valerie@epa.gov>
Subject: RE: Edwardsport and Pruitt meeting

I should be free until 11. Thanks.

From: Greenwalt, Sarah [mailto:greenwalt.sarah@epa.gov]
Sent: Tuesday, November 28, 2017 9:56 AM
To: Ghanta, Venu G; Washington, Valerie
Subject: Re: Edwardsport and Pruitt meeting

Yes. What is your availability for Thursday morning?

Sent from my iPhone

On Nov 28, 2017, at 8:50 AM, Ghanta, Venu G <Venu.Ghanta@duke-energy.com> wrote:

> Hi Sarah-
>
> Duke's CEO, Lynn Good, plans to meet with Administrator Pruitt next week. It sounds we are nearing a resolution with Edwardsport, but I want to confirm that with you so I can determine if Lynn needs to raise it with the Administrator. Would you have a few minutes this week to discuss?
>
> Thanks, Venu
>
> On Nov 20, 2017, at 4:59 PM, Greenwalt, Sarah <greenwalt.sarah@epa.gov> wrote:
>
> > Yes, my sincerest apologies for missing you. I do not have any executive help at the moment and am clearly lost!

Do you have any availability for Wednesday morning?

Sarah A. Greenwalt
Senior Advisor to the Administrator
for Water and Cross-Cutting Issues

U.S. Environmental Protection Agency
Work: 202-564-1722 Ex. 6
Greenwalt.Sarah@epa.gov

From: Ghanta, Venu G [mailto:Venu.Ghanta@duke-energy.com]
Sent: Tuesday, November 14, 2017 12:24 PM
To: Greenwalt, Sarah <greenwalt.sarah@epa.gov>
Subject: RE: Edwardsport question

Hi Sarah-

Hope you are well. Since we missed each other last week, would you be available to have this call sometime this week?

Thanks, Venu

-----Original Appointment-----
From: Greenwalt, Sarah [mailto:greenwalt.sarah@epa.gov]
Sent: Wednesday, November 08, 2017 2:46 PM
To: Greenwalt, Sarah; Ghanta, Venu G
Subject: Edwardsport question
When: Thursday, November 09, 2017 3:15 PM-3:30 PM (UTC-05:00) Eastern Time (US & Canada).
Where: Sarah will call you on Ex. 6

*** Exercise caution. This is an EXTERNAL email. DO NOT open attachments or click links from unknown senders or unexpected email. ***

Message

From: Duncan, Deidre [dduncan@hunton.com]
Sent: 11/28/2017 3:33:19 PM
To: Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]; Thomas Garcia (thomas_garcia@nps.gov) [thomas_garcia@nps.gov]; Aurelia Skipwith (aurelia_skipwith@ios.doi.gov) [aurelia_skipwith@ios.doi.gov]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: Environmental Law & Policy - Final Agenda
Attachments: Insights into Env Law and Policy - Draft Agenda (11.28.17)_66686475_19-c.DOCX

Aurelia and Lee (and Crystal and Thomas),
Here is the final agenda for the conference. Please note that our panel starts at 3:30 and runs until 4:15. Thanks. Look forward to talking more about the panel tomorrow at 11:00.
Deidre

Insights into Environmental Law & Policy: A Conversation with Key Regulators

November 30, 2017 | Washington, DC
1:00 p.m. – 5:30 p.m. | Reception 5:30 p.m. – 7:30 p.m.

1:00 p.m. – 1:30 p.m. ..... **Registration**

1:30 – 1:45 p.m. ..... **Opening Remarks, Joseph Stanko**, *Former Counsel, Energy and Commerce Committee, US House of Representatives*

1:45 – 2:30 p.m. ..... **Which Way Does the Wind Blow: Priorities and Developments in Air Quality and Climate Change Regulation**

Mandy Gunasekara, *Principal Deputy Assistant Administrator, Office of Air and Radiation, US EPA*

Moderators: **Shannon Broome**, *Former Global Head of Air Programs, General Electric Company, Vice-Chair and past Co-Chair ABA Climate Change, Sustainable Development, and Ecosystems Committee*; **Aaron Flynn**, *Former Associate General Counsel, White House Office of Science and Technology Policy, Former Legislative Attorney, Congressional Research Service*

2:30 – 3:15 p.m. ..... **The Perspective of the "In-House" Lawyer in the Trump Administration**

Kevin Minoli, *Acting General Counsel, US EPA*

Moderators: **J. Tom Boer**, *Former Attorney, Office of General Counsel, US EPA and Environment and Natural Resources Division, US DOJ;* **Todd S. Mikolop**, *Former Federal Prosecutor, Environment and Natural Resources Division, US DOJ and Judge Advocate, US Coast Guard*

3:15 – 3:30 p.m. ..... **Break**

3:30 – 4:15 p.m. ..... **Where The Wild Things Are: Wetlands, Species and Land Management**

Aurelia Skipwith, *Deputy Assistant Secretary for Fish, Wildlife and Parks, US DOI*
Lee Forsgren, *Deputy Assistant Administrator for Water, US EPA*

Moderators: **Deidre Duncan**, *Former Assistant General Counsel of the Army at the Pentagon;* **Andrew Turner**, *Former Chief of*

General Law, US Coast Guard Headquarters and Attorney, NOAA General Counsel

4:15 – 4:45 p.m. ..... **Administration Priorities**

Mary Neumayr, *Chief of Staff, The Council on Environmental Quality*

Moderator: **Joseph Stanko**, *Former Counsel, Energy and Commerce Committee, US House of Representatives*

4:45 – 5:30 p.m. ..... **Administration Plans to Review and Improve Agency Decision Making**

[OMB Speaker],

Moderator: **Chuck Knauss**, *Former Counsel, Energy and Commerce Committee, US House of Representatives and Lead Counsel on the Clean Air Act Amendments of 1990*

5:30 – 7:30 p.m. ..... **Networking Reception**

Message

From: Turner, Andrew [aturner@hunton.com]
Sent: 11/28/2017 1:36:46 AM
To: Duncan, Deidre [dduncan@hunton.com]
CC: Aurelia Skipwith [aurelia_skipwith@ios.doi.gov]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]; Thomas Garcia [thomas_garcia@nps.gov]; Maureen Foster [Maureen_Foster@ios.doi.gov]
Subject: Re: Environmental Law & Policy Conference (DC)

I am clear until 1 Wednesday as well.

Andrew

On Nov 27, 2017, at 6:31 PM, Duncan, Deidre <dduncan@hunton.com<mailto:dduncan@hunton.com>> wrote:

I am open before 1:00 on Wednesday if others can make that. Let me know.

On Nov 27, 2017, at 6:01 PM, Aurelia Skipwith <aurelia_skipwith@ios.doi.gov<mailto:aurelia_skipwith@ios.doi.gov>> wrote:

Lee and Deidre,
  I'm getting on a plane at 4:50pm EST so I'll only be able to attend for ~15 minutes. Can we talk before 1pm EST or on Wednesday? Thank you.

Sent from my iPhone

On Nov 23, 2017, at 8:43 PM, Aurelia Skipwith <aurelia_skipwith@ios.doi.gov<mailto:aurelia_skipwith@ios.doi.gov>> wrote:

I'm on a flight during this time. Can we talk on Friday or Monday. Thank you.

Sent from my iPhone

On Nov 20, 2017, at 1:07 PM, Forsgren, Lee <Forsgren.Lee@epa.gov<mailto:Forsgren.Lee@epa.gov>> wrote:

Hopefully, both of you can join at this time to coordinate our panel discussion.
Deidre

-----Original Appointment-----
From: Penman.Crystal@epa.gov<mailto:Penman.Crystal@epa.gov> [mailto:Penman.Crystal@epa.gov] On Behalf Of Forsgren, Lee
Sent: Monday, November 20, 2017 12:55 PM
To: Forsgren, Lee; Duncan, Deidre
Subject: Environmental Law & Policy Conference (DC)
When: Tuesday, November 28, 2017 5:00 PM-5:45 PM (UTC-05:00) Eastern Time (US & Canada).
Where: Call in [Ex. 6]

<mime-attachment.ics>

Message

From: Harb, Kim [Kim.Harb@alyeska-pipeline.com]
Sent: 11/2/2017 7:55:36 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
CC: Khary Cauthen [cauthenk@api.org]; Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]
Subject: Re: [EXTERNAL]: Re: Clean Water Act Small Vessel NPDES General Permit

Thanks Lee. Yes, that would be great. Travel safely!

Kim Harb
Alyeska Pipeline Service Co.
Office:
Mobile: **Ex. 6**

On Nov 2, 2017, at 11:22 AM, Forsgren, Lee <Forsgren.Lee@epa.gov> wrote:

> Kim,
>
> I am on travel out of the country this week. Can we talk next week? Crystal Penman can help find a time that works for all of us.
>
> Lee
>
> Sent from my iPhone
>
> On Nov 2, 2017, at 9:10 AM, Khary Cauthen <cauthenk@api.org> wrote:
>
> > Lee/Kim sorry for being slow to link the two of you up.
> >
> > Lee: Kim has a question regarding the pending the current treatment expires next month on December 18th
> > You should also know that Kim has a wealth of experiences from her time in prior administrations and is willing to assist and has some thoughts to share as appropriate on a more durable permanent solution.
> >
> > Kim: Lee is the man with the plan and the Deputy AA in the Water Office who comes recommended. His desk # is 202-564-0311

Message

From: Schwartz, Jerry [Jerry_Schwartz@afandpa.org]
Sent: 12/7/2017 3:40:17 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: RE: Phone Call

Thx will be at my desk Ex. 6

From: Forsgren, Lee [mailto:Forsgren.Lee@epa.gov]
Sent: Thursday, December 7, 2017 10:34 AM
To: Schwartz, Jerry <Jerry_Schwartz@afandpa.org>
Subject: Re: Phone Call

Will call at 10:45 EST.

Sent from my iPhone

On Dec 7, 2017, at 9:07 AM, Schwartz, Jerry <Jerry_Schwartz@afandpa.org> wrote:

> Lee,
>
> It is urgent and we should talk as soon as possible.
>
> Jerry
>
> **From:** Forsgren, Lee [mailto:Forsgren.Lee@epa.gov]
> **Sent:** Thursday, December 7, 2017 9:26 AM
> **To:** Schwartz, Jerry <Jerry_Schwartz@afandpa.org>
> **Subject:** Re: Phone Call
>
> Jerry
>
> Am on travel and not really available today. Will be back in the office tomorrow. Let's talk then.
>
> Lee
>
> Sent from my iPhone
>
> On Dec 7, 2017, at 8:05 AM, Schwartz, Jerry <Jerry_Schwartz@afandpa.org> wrote:
>
> > Mr. Forsgren,
> >
> > Please give me a call at the number below or my cell number: Ex. 6
> > Ex. 6 Thank you.
> >
> > **Jerry Schwartz**
> > Senior Director
> > Energy and Environmental Policy
> > Jerry_Schwartz@afandpa.org
> > Ex. 6
> > AMERICAN FOREST & PAPER ASSOCIATION
> > 1101 K Street, N.W., Suite 700
> > Washington, D.C. 20005

<image001.jpg> <image002.jpg> <image003.jpg><image004.jpg><image005.jpg><image006.jpg>

Message

From: Khary Cauthen [cauthenk@api.org]
Sent: 10/25/2017 5:16:39 PM
To: Letendre, Daisy [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b691cccca6264ae09df7054c7f1019cb-Letendre, D]
CC: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: Re: Clean Water Act Small Vessel NPDES General Permit

Awesome thanks

Sent from my iPhone

On Oct 25, 2017, at 12:56 PM, Letendre, Daisy <letendre.daisy@epa.gov> wrote:

> Thanks Lee – looping you in with Khary Cauthen from API.
>
> Khary, Lee is our Deputy AA in the Office of Water. His desk # is 202-564-0311, he'll be able to get you the full answer.
>
> **From:** Forsgren, Lee
> **Sent:** Wednesday, October 25, 2017 12:46 PM
> **To:** Letendre, Daisy <letendre.daisy@epa.gov>; Greenwalt, Sarah <greenwalt.sarah@epa.gov>
> **Subject:** RE: Clean Water Act Small Vessel NPDES General Permit
>
> Daisy,
> Which small vessel permit is Kim talking about. There are two that apply to his vessels. One permit is issued by R10 and expires soon the other applies to all vessels in the United States above 72' (which Alyeska's are) and may, Congress doesn't fix the problem expire at the end of the year. Have Kim contact me and I will answer whichever issue she is talking about.
>
> Lee
>
> **From:** Letendre, Daisy
> **Sent:** Wednesday, October 25, 2017 10:12 AM
> **To:** Greenwalt, Sarah <greenwalt.sarah@epa.gov>; Forsgren, Lee <Forsgren.Lee@epa.gov>
> **Subject:** FW: Clean Water Act Small Vessel NPDES General Permit
>
> Hi Sarah and Lee – do either of you know the answer to this?
>
> **From:** Khary Cauthen [mailto:cauthenk@api.org]
> **Sent:** Tuesday, October 24, 2017 4:47 PM
> **To:** Letendre, Daisy <letendre.daisy@epa.gov>
> **Subject:** Clean Water Act Small Vessel NPDES General Permit
>
> Daisy: good afternoon, hope that all is well with you. do you know the answer to this question?
>
> **From:** Harb, Kim [mailto:Kim.Harb@alyeska-pipeline.com]
> **Sent:** Tuesday, October 24, 2017 4:21 PM
> **To:** Khary Cauthen
> **Subject:** Clean Water Act Small Vessel NPDES General Permit

Hey Khary - the temporary fix on this expires @ December 18. Is there anything in the works to extend it - or to do a permanent fix?

Kim

Kim Harb
Alyeska Pipeline Service Co.
Office:
Mobile: Ex. 6

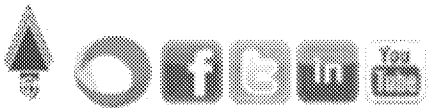
Message

From: Schwartz, Jerry [Jerry_Schwartz@afandpa.org]
Sent: 12/7/2017 2:04:33 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: Phone Call

Mr. Forsgren,

Please give me a call at the number below or my cell number: Ex. 6 Thank you.

Jerry Schwartz
Senior Director
Energy and Environmental Policy
Jerry_Schwartz@afandpa.org
Ex. 6
AMERICAN FOREST & PAPER ASSOCIATION
1101 K Street, N.W., Suite 700
Washington, D.C. 20005



Message

From: Duncan, Deidre [dduncan@hunton.com]
Sent: 10/30/2017 4:52:54 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
CC: Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]
Subject: RE: Environmental Law & Policy Conference (DC)

Thanks so much! I'll look forward to hearing back from Crystal. Crystal, let me know if you need any additional information. We can adjust the times a bit if necessary so let me know. Thanks so much for your consideration.
Deidre

From: Forsgren, Lee [mailto:Forsgren.Lee@epa.gov]
Sent: Monday, October 30, 2017 12:51 PM
To: Duncan, Deidre
Cc: Penman, Crystal
Subject: RE: Environmental Law & Policy Conference (DC)

Deidra,

I would be honored to participate if my schedule will permit. Crystal Penman of my office will work with you to see what the art of the possible might be.

Regards,
Lee

D. Lee Forsgren
Deputy Assistant Administrator
Office Of Water
Environmental Protection Agency
1200 Pennsylvania Avenue, VW
Room 3219 WJCE
Washington, DC 20460
Phone: 202-564-5700
Forsgren.Lee@epa.gov

From: Duncan, Deidre [mailto:dduncan@hunton.com]
Sent: Monday, October 30, 2017 12:46 PM
To: Forsgren, Lee <Forsgren.Lee@epa.gov>
Subject: Environmental Law & Policy Conference (DC)

Hello, Lee. I really enjoyed hearing you speak at the recent NMA event, and I wanted to see if you might be available to speak at an upcoming event. Our law firm, Hunton & Williams LLP, is hosting an Environmental Law and Policy Conference in Washington, D.C. on November 30,

2017 from 1:00 – 5:30 p.m. For each of the past several years, Hunton & Williams has invited senior Administration officials from various key agencies and departments to discuss the important environmental issues facing the Administration. We've been fortunate each year to have several high level panelists (e.g., Avi Garbow, then EPA General Counsel was our keynote last year) and we will have similar participants this year. We have about 150+ attendees each year – mostly general counsels, assistant general counsels and decision makers for organizations who are knowledgeable about environmental issues.

We currently have Ms. Aurelia Skipwith scheduled to speak from 2:45-3:30 on natural resources issues, particularly Endangered Species Act and other species-related issues. We were hoping that you could join her on the panel to address the wetlands and water issues, and in particular the upcoming WOTUS rulemaking. Let me know if you are available and could participate. Thanks so much, and I hope you can make it on November 30th!

Deidre Duncan
Ex. 6

HUNTON& WILLIAMS

Deidre G. Duncan
Partner
dduncan@hunton.com
Ex. 6
bio | vCard

Hunton & Williams LLP
2200 Pennsylvania Avenue, NW
Washington, DC 20037
hunton.com

Message

From: McGrath, Kerry L. [KMcGrath@hunton.com]
Sent: 7/11/2018 8:55:51 PM
To: Keenan, Dru [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=9525dc06e2e74bb89da45f7e19b2e0ca-Keenan, Dru]
CC: Loren.Moore@deq.idaho.gov; Bulleit, Kristy [kbulleit@hunton.com]; Jeff Leahey (NHA) (jeff@hydro.org) [jeff@hydro.org]; 'Thomas A. Stanko' [Thomas.Stanko@cmsenergy.com]; Ross, David P [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=119cd8b52dd14305a84863124ad6d8a6-Ross, David]; Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]; Sawyers, Andrew [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=49214552a00b4ab7b168ec0edba1d1ac-Sawyers, Andrew]; McDonough, Owen [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=10a92c71b552413694fed6fa08522f4f-McDonough,]
Subject: Joint NHA and UWAG Comments on EPA R10 General Permit for Idaho Hydros 7-11-18
Attachments: Joint NHA and UWAG Comments on EPA R10 General Permit for Idaho Hydros 7-11-18_69876736_23.PDF

Ms. Keenan:
The National Hydropower Association and the Utility Water Act Group submit the attached comments on the EPA Region 10 Proposed Issuance of NPDES General Permit for Hydroelectric Facilities Within the State of Idaho. We appreciate the opportunity to provide comment on the proposal, which we believe raises significant issues for hydropower project operators in the region and beyond.

If you have any questions about these comments or wish to discuss the issues further, please do not hesitate to contact me.

Thank you,
Kerry

HUNTON
ANDREWS KURTH

Kerry McGrath
Partner
KMcGrath@HuntonAK.com
Ex. 6
bio | vCard

Hunton Andrews Kurth LLP
2200 Pennsylvania Avenue, NW
Washington, DC 20037

HuntonAK.com

July 11, 2018

Via E-Mail

Ms. Dru Keenan
Office of Water and Watersheds
U.S. Environmental Protection Agency, Region 10
1200 Sixth Avenue, Suite 155
OWW-191
Seattle, WA 98101
keenan.dru@epa.gov

Re: Comments of the National Hydropower Association and the Utility Water Act Group on the EPA Region 10 Proposed Issuance of NPDES General Permit for Hydroelectric Facilities Within the State of Idaho (IDG360000)

Dear Ms. Keenan:

The National Hydropower Association and the Utility Water Act Group respectfully submit the following comments on the EPA Region 10 Proposed Issuance of NPDES General Permit for Hydroelectric Facilities Within the State of Idaho (IDG360000), 83 Fed. Reg. 18,555 (Apr. 27, 2018). We appreciate the opportunity to provide comment on the proposal, which we believe raises significant issues for hydropower project operators in the region and beyond.

If you have any questions about these comments or wish to discuss the issues further, please contact Kerry McGrath at Ex. 6 or kmcgrath@HuntonAK.com

We appreciate your attention to this important matter.

Sincerely,

Jeffrey Leahey
Deputy Executive Director
National Hydropower Association
601 New Jersey Avenue, NW, Suite 660
Washington, DC 20001

Thomas Stanko
Consumers Energy Company
1945 West Parnall Road
Jackson, MI 49201
Chair, UWAG Cooling Systems Committee

Kerry L. McGrath
Hunton Andrews Kurth LLP
2200 Pennsylvania Avenue, NW
Washington, DC 20037
Counsel to National Hydropower Association and Utility Water Act Group

cc: Loren Moore, Idaho Department of Environmental Quality (Loren.Moore@deq.idaho.gov)
David Ross, EPA Headquarters (Ross.davidp@epa.gov)
Lee Forsgren, EPA Headquarters (Forsgren.lee@epa.gov)
Andrew Sawyers, EPA Headquarters (Sawyers.andrew@epa.gov)
Owen McDonough, EPA Headquarters (McDonough.owen@epa.gov)





The National Hydropower Association and the Utility Water Act Group Comments on EPA's Proposed Issuance of NPDES General Permit for Hydroelectric Facilities Within the State of Idaho

83 Fed. Reg. 18,555 (Apr. 27, 2018)

July 11, 2018

Executive Summary

With the U.S. Environmental Protection Agency ("EPA" or "Agency") Region 10's proposed National Pollutant Discharge Elimination System ("NPDES") general permit for hydroelectric facilities discharging to waters within the State of Idaho ("Proposed Permit") (IDG360000), 83 Fed. Reg. 18,555 (Apr. 27, 2018), EPA, for the first time in a rule or permitting action of general applicability, takes the position that hydroelectric facilities are subject to the requirements of Clean Water Act ("CWA") § 316(b), 33 U.S.C. § 1326(b), and EPA's 2014 Final Rule to Establish Requirements for Cooling Water Intake Structures at Existing Facilities and Amend Requirements at Phase I Facilities, 79 Fed. Reg. 48,300 (Aug. 15, 2014) ("2014 Rule" or "Existing Facilities Rule").

Unlike the other facilities to which EPA has applied § 316(b), EPA has not established technology-based limitations and standards for hydroelectric facilities, nor would it be reasonable to do so given the *de minimis* nature of their discharges. EPA never collected any information on the design, location, construction, and capacity of pipes or other features used to divert water for use in cooling equipment in hydroelectric facilities, or on the environmental impacts of those features. As these comments will show, that omission is crucial because hydroelectric facilities differ substantially from the largely land-based steam electric plants and industrial facilities for which EPA developed the 2014 Rule and every other § 316(b) rule the Agency has adopted. Of equal significance, EPA has never considered any of the legal, technical, or economic issues involved in applying § 316(b) to hydroelectric facilities.

The Proposed Permit nevertheless relies on the 2014 Rule's standards for steam electric power and manufacturing plants to establish the Region's best professional judgment ("BPJ") about what "cooling water intake structure" ("CWIS") is the best technology available ("BTA") "to minimize [the] adverse environmental effects of [CWIS]" at hydroelectric facilities, and

requires that the permit conditions reflecting those technologies be met within 180 days of the effective date of the permit.[1]

There are several key problems with Region 10's proposal. First, interpreting CWA § 316(b) to apply to hydroelectric generation facilities would be a significant expansion of EPA's regulatory jurisdiction and would duplicate other federal and state requirements specifically designed to address these environmental impacts. Second, EPA has never provided notice or an opportunity for comment on the applicability of § 316(b) to hydroelectric facilities. In fact, the Agency explicitly stated that withdrawals from hydroelectric facilities were not meant to be addressed in its Existing Facilities Rule. 76 Fed. Reg. 22,174, 22,190 (Apr. 20, 2011). It would be arbitrary and capricious, and contrary to the Administrative Procedure Act ("APA") requirements for fair notice and opportunity for comment, for EPA to now adopt such a novel, post-hoc interpretation. Third, even if EPA, after full and procedurally appropriate consideration of the issue, concluded that CWA § 316(b) applies to hydroelectric facilities (which NHA and UWAG believe it should not), the requirements of the 2014 Rule are not appropriate for such facilities, which are fundamentally different from the steam electric power and manufacturing plants EPA considered in that rulemaking, both in terms of the feasibility and cost of technology and the assessment of environmental impacts. Indeed, the 2014 Rule's requirements would be unnecessary in most cases because the rates of impingement and entrainment would be so low that additional controls would not be warranted.

In the Proposed Permit, Region 10 proposes to establish new BTA requirements based on its "best professional judgment" without first characterizing and evaluating the attributes of the facilities in question and determining whether they have already minimized adverse

[1] *See* EPA, NPDES Fact Sheet, Proposed Wastewater Discharges from Hydroelectric Generating Facilities General Permit, IDG360000, at 23 (Apr. 27, 2018) ("Proposed Permit Fact Sheet").

environmental effects and without identifying the technologies, measures, procedures, and methods the Agency anticipates facilities would use to meet the requirements imposed by the permit. In fact, it would be very difficult and, in some cases, infeasible, for many hydroelectric facilities to comply with the requirements outlined in the Proposed Permit and, even if some facilities could comply, the costs of doing so would likely far exceed any plausible environmental benefits. For all of these reasons, discussed in more detail in these joint comments, Region 10 should remove any § 316(b)-related provisions from the Proposed Permit. Finally, in addition to the § 316(b)-related measures, a number of discharge-related provisions in the Proposed Permit require clarification and/or revision.

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The National Hydropower Association and the Utility Water Act Group Comments on EPA's Proposed Issuance of NPDES General Permit for Hydroelectric Facilities Within the State of Idaho

I. Introduction

EPA Region 10 has proposed to issue a NPDES general permit for hydroelectric facilities discharging to waters within the State of Idaho. 83 Fed. Reg. 18,555 (Apr. 27, 2018). With the Proposed Permit, EPA, for the first time in a rule or permitting action of general applicability, takes the position that hydroelectric facilities are subject to the requirements of CWA § 316(b), 33 U.S.C. § 1326(b), and EPA's 2014 Rule.

The Proposed Permit would apply only to hydroelectric facilities that require an NPDES permit to discharge pollutants associated with the operation of hydroelectric facilities to waters of the United States in Idaho, and that use water to cool some of that equipment, where the amount of cooling water falls below the 2014 Rule's qualifying thresholds.[2] Region 10 asserts that those hydroelectric facilities must meet CWA § 316(b) requirements established by the Director on a case-by-case, BPJ basis under 40 C.F.R. § 125.90(b). Proposed Permit Fact Sheet at 22-23, 28. The Proposed Permit purports to reflect Region 10's BPJ about what CWIS technology is the best available "to minimize [the] adverse environmental effects of [CWIS]" at hydroelectric facilities and requires that the permit conditions reflecting those technologies be met within 180 days of the effective date of the permit. Proposed Permit Fact Sheet at 23.

The Region's proposal to apply CWA § 316(b), even on a BPJ case-by-case basis, to hydroelectric facilities is neither compelled by nor consistent with the CWA. And, as demonstrated in these comments, even if CWA § 316(b) were applicable, the Region's proposed

[2] *See* Proposed Permit Fact Sheet at 19. The 2014 Rule's stringent requirements apply only to facilities that are point sources requiring an NPDES permit, withdraw from a water of the United States, use CWIS with a design intake flow of greater than 2 million gallons per day ("MGD"), and use 25 percent or more of the water withdrawn exclusively for cooling purposes. 40 C.F.R. § 125.91(a).

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BPJ requirements are arbitrary and capricious for several reasons. First, the Fact Sheet demonstrates that the Region borrowed from and relies on a rule that EPA expressly stated did not apply to hydroelectric facilities and that the Agency adopted without any consideration of the technical feasibility or cost of application of such requirements to hydroelectric facilities. Proposed Permit Fact Sheet at 28.

Second, the Region has provided no independent analysis or support for any of the proposed requirements. Indeed, for many of the conditions imposed, neither the Fact Sheet nor the Proposed Permit provide any meaningful indication of technology or methods the permit might be expected to employ, nor does the proposal provide any discussion of the technical feasibility, costs, benefits, or other relevant factors associated with those conditions. This deficiency is not limited to the requirements based on EPA's 2014 Rule. The Region has not provided, for example, any analysis of or support for the Proposed Permit's requirement that, to comply with the proposed BTA requirements established for CWIS, facilities must maintain screening technologies established in National Marine Fisheries Service ("NMFS") Northwest Region's Anadromous Salmonid Passage Facility Design guidelines, which were developed by NMFS for hydroelectric turbines, not cooling water diversion pipes.

The National Hydropower Association ("NHA") is the national non-profit trade association dedicated to promoting the growth of clean, affordable, U.S. hydropower. It seeks to secure hydropower's place as a renewable and reliable energy source that serves national environmental, energy, and economic policy objectives. NHA's membership includes more than 240 companies, from Fortune 500 corporations to family-owned small businesses. NHA members include public and investor-owned utilities, independent power producers, developers, equipment manufacturers and other service providers. In the United States, hydropower plants

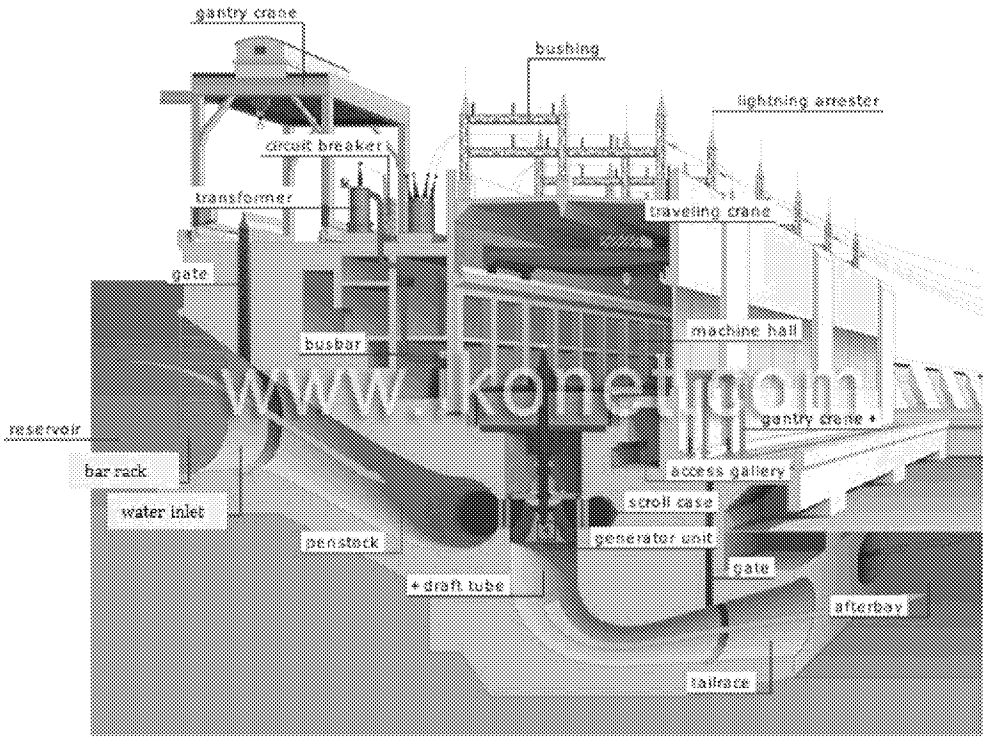
provide about 6 to 7 percent of the nation's total electric generation and pumped storage hydropower plants provide the vast majority of energy storage, approximately 97 percent. NHA's membership includes Idaho companies that will be directly affected by the Proposed Permit.

The Utility Water Act Group ("UWAG") is a voluntary, non-profit, unincorporated group of 146 individual energy companies and three national trade associations of energy companies: the Edison Electric Institute, the National Rural Electric Cooperative Association, and the American Public Power Association. UWAG members operate hydroelectric facilities, power plants, and other facilities that generate, transmit, and distribute electricity to residential, commercial, industrial, and institutional customers. One of UWAG's purposes is to participate on behalf of its members in EPA regulatory actions under the CWA and in litigation arising from those regulatory actions. UWAG's membership includes owners and operators of hydroelectric facilities that would be affected by the adoption and issuance of the Proposed Permit.

Hydroelectric facilities vary significantly in terms of design and configuration, especially when it comes to the pipes and structures that divert water for purposes of cooling. Generally, water diverted for cooling is primarily sourced from three locations within the hydroelectric facility: (1) the penstock – a closed conduit or pipe that conveys water from the reservoir to the turbine, (2) the turbine scroll case – a spiral-shaped steel structure distributing water flow through the wicket gates located just prior to the turbine, or (3) a water inlet port located on the face of the dam. There likely are exceptions to these locations, because each facility has a unique, location-specific design to take maximum advantage of the hydraulics of that location. An individual facility may use one design exclusively, or may use a combination of designs. After use for cooling, diverted water is transferred downstream primarily via these methods: (1)

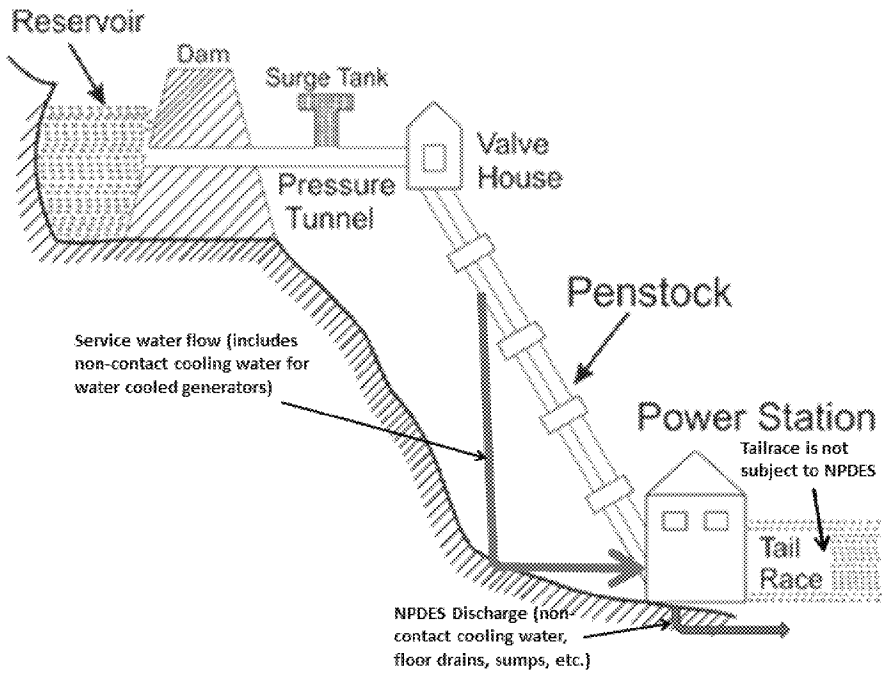
directed back to the penstock and re-used to generate electricity, (2) directed back to the scroll case (low head dams mainly) and re-used to generate electricity, (3) directed to the tailrace via the draft tube, or (4) direct transfer to the tailrace. The features of a typical hydroelectric facility are depicted in Figure 1, and an example of a facility diverting cooling water from the penstock is depicted in Figure 2.

Figure 1[3]



[3] The Visual Dictionary, Cross Section of a Hydroelectric Plant, www.ikonet.com.

Figure 2



Accordingly, hydroelectric generating facilities do not have CWISs in the conventional industrial context upon which the current § 316(b) regulations were developed. Hydroelectric facilities bring a wide variety of technical challenges associated with characterizing impingement and entrainment, and applying technologies that EPA considered in its 2014 rulemaking as available for on-shore facilities. This is evident in the 2014 Rule's definition of a CWIS. EPA's regulations define CWIS as "the total physical structure and any associated construction waterways used to withdraw cooling water from waters of the United States. The [CWIS] extends from the point at which water is first withdrawn from waters of the United States up to, and including the intake pumps." 40 C.F.R. § 125.92(f). The 2014 Rule envisions the use of pumps to actively *withdraw* cooling water from surface waters that are waters of the U.S., but this broad definition is inappropriate for hydroelectric facilities, which are diversion structures by design – impounding water and transporting/passing water along a contiguous waterway to

turn turbines used to generate electricity.[4] Relative to the total water transported through the facility, a very small amount of water is diverted for cooling. In general, cooling water accounts for less than 1% of the total water transported through the facility and in some cases less than 0.1%. For example, at the Keowee Hydro Station the cooling water is generally less than 0.01% of the total discharge flow.[5] As explained in further detail herein, given the wide range of configurations for hydroelectric facilities and different processes for diverting water for cooling, the best available technologies and sampling requirements imposed by EPA for steam electric power plants and manufacturing plants are not necessarily appropriate or practical for hydroelectric facilities. The Region 10 Proposed Permit fails to consider or account for these challenges.

II. EPA's Interpretation and Implementation of § 316(b) To Date

A. EPA's Prior Regulations Implementing § 316(b) Have Not Addressed Hydroelectric Facilities.

Section 316(b) provides:

> Any standard established pursuant to section 1311 of this title or section 1316 of this title and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.

33 U.S.C. § 1326(b).

EPA has implemented this provision by issuing regulations that establish BTA standards for intake structures that become binding for a particular facility only after the standards are incorporated into an NPDES permit for discharges from a regulated facility. At no point during

[4] Hydroelectric facilities do not have conventional CWIS and their configurations vary. These comments refer to the mechanisms that divert cooling water as intakes, pipes, or diversion structures.

[5] South Carolina NPDES Permit No. SC0000515, Fact Sheet and Permit Rationale at 18 (Mar. 16, 2011).

EPA's long history of implementing § 316(b) have EPA's regulatory actions addressed or evaluated the applicability of CWA § 316(b) to hydroelectric facilities.

In 1976, EPA issued its first § 316(b) rule, 41 Fed. Reg. 17,387 (Apr. 26, 1976), but the Fourth Circuit remanded it to EPA on procedural grounds. *Appalachian Power Co. v. Train*, 566 F.2d 451 (4th Cir. 1977). EPA's remaining rule and guidance instructed NPDES permit writers to make case-by-case determinations regarding BTA for CWIS at point sources subject to EPA standards established pursuant to §§ 301 or 306. *See* 40 C.F.R. § 401.14 ("The location, design, construction and capacity of cooling water intake structures of any point source for which a standard is established pursuant to section 301 or 306 of the Act shall reflect the best technology available for minimizing adverse environmental impact, in accordance with the provisions of part 402 of this chapter."); 33 U.S.C. § 1342(a)(1)(B).[6] By its terms, § 401.14 applies only to those point sources for which technology-based standards are established under §§ 301 and 306. By contrast, even where hydroelectric facilities require NPDES permits for discharges, the limits imposed are largely water quality-based.[7] Although § 401.14 has been in effect since 1976, generally, neither federal nor state NPDES permitting authorities read § 401.14 as applicable to hydroelectric facilities that are issued NPDES permits for minor equipment-related discharges.[8]

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[6] *See also* EPA, *Draft Guidance for Evaluating the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment: Section 316(b) Public Law 92–500*, at 4 (1977) ("The environment-intake interactions in question are highly site-specific and the decision as to best technology available for intake design, location, construction, and capacity must be made on a case-by-case basis.").

[7] *See, e.g.*, Arkansas NPDES Permit No. AR0048755, Statement of Basis at 6-7 (Apr. 13, 2017); Arkansas NPDES Permit No. AR0048763, Statement of Basis at 7 (Sept. 4, 2013); West Virginia NPDES Permit No. WV0078859, App. A § I.12 (Aug. 9, 2016); South Carolina Department of Health and Environmental Control, NPDES General Permit for Hydroelectric Generating Facilities, Permit No. SCG360000 (May 15, 2015).

[8] *See, e.g.*, NPDES General Permits for Hydroelectric Facilities in the States of Massachusetts and New Hampshire, Permit Nos. MAG360000, NHG360000 (Nov. 10, 2009); ADEM General Permit Rationale, Hydroelectric Facilities ALG360000 (Aug. 18, 2015); South Carolina Department of Health and Environmental Control, NPDES General Permit for Hydroelectric Generating Facilities, Permit No. SCG360000 (May 15, 2015); North Carolina Department of Environment and Natural Resources, NPDES General Permit No. NCG50000 (Oct. 1, 2015). We are aware of one exception, discussed in note 38, infra.

Since 1976, EPA has issued a series of regulations implementing § 316(b) for new facilities, as well as existing steam electric plants and manufacturing facilities. The Phase I rule established national technology-based performance requirements for new facilities that withdraw greater than 2 MGD of surface water and use at least 25 percent of the water they withdraw for cooling purposes. 66 Fed. Reg. at 65,255 (Dec. 18, 2001). The Phase II rule set requirements for existing steam electric plants with flows greater than 50 MGD, 69 Fed. Reg. 41,576 (July 9, 2004), but certain aspects of the rule were invalidated by the U.S. Court of Appeals for the Second Circuit and later withdrawn.[9] The rules for lower flow steam electric plants and all manufacturing facilities (known as the Phase III rules) were also withdrawn. 71 Fed. Reg. 35,006 (June 16, 2006). In place of the Phase II and III rules, in 2014, EPA issued a single rule for existing facilities – the 2014 Existing Facilities Rule.[10]

During the development of the Phase I, II, and III rules, EPA never suggested that any of those rules would apply to hydroelectric facilities, whether or not the facilities use cooling water or need an NPDES permit. None of EPA's Information Collection Requests ("ICRs") were directed at hydroelectric facilities, nor did EPA use any other method to collect or consider information on cooling water diversion or use by hydroelectric facilities. Variations in the locations, design, and configurations of cooling water "intakes" unique to hydroelectric facilities were never contemplated in EPA's previous facility surveys or technology evaluations for promulgating § 316(b) regulations for new or existing power generating facilities. EPA did not consider whether hydroelectric facilities could feasibly monitor or otherwise assess entrainment or impingement mortality associated with cooling water diversion or whether those facilities

[9] *Riverkeeper, Inc. v. EPA*, 475 F.3d 83 (2d Cir. 2007); 72 Fed. Reg. 37,107 (July 9, 2007).

[10] Final Regulations To Establish Requirements for Cooling Water Intake Structures at Existing Facilities and Amend Requirements at Phase I Facilities, 79 Fed. Reg. 48,300 (Aug. 15, 2014).

could distinguish such mortality from mortality occurring by virtue of the passage of water through the turbines. Nor did EPA consider the availability, performance, or cost of technologies for reducing entrainment or impingement mortality that might be caused by hydroelectric facilities' cooling water "intakes," which often consist of one or more relatively small pipes diverting water from within or coming off of the penstock or draft tube of a hydroelectric facility or in some other location depending upon the broader facility design and operation.

The development of EPA's 2014 § 316(b) Rule was no different; EPA's ICR solicited no information from any hydroelectric facility.[11] As discussed below, EPA stated in the preamble to the proposed rule that water withdrawals for generation of electricity by hydroelectric facilities were not subject to the rule. *See* 76 Fed. Reg. 22,174, 22,190 (Apr. 20, 2011). As a result of this express and unambiguous statement, EPA received no comments regarding the potential applicability of CWA § 316(b) to hydroelectric facilities or addressing the potential impacts of applying the proposed technology requirements to hydroelectric facilities. Indeed, in the final 2014 Existing Facilities Rule, EPA estimated that a total of 1,065 facilities (544 electric generators and 521 manufacturers) would be subject to the Rule. 79 Fed. Reg. at 48,305. None of those facilities were hydroelectric power generators.[12] Thus, EPA never collected the necessary information to evaluate impacts of the Rule on hydroelectric facilities, even though some hydropower generators divert more than 2 MGD and use 25 percent or more of the diverted water for cooling purposes.

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[11] *See* Information Collection Request (ICR) for CWIS at Existing Facilities (Final Rule), OMB Control No. 2040-0257, EPA ICR No. 2060.07 (Aug. 2014).

[12] 2014 TDD at 4-24 ("From the universe of facilities with a steam electric prime mover and based on data collected from EPA's industry technical questionnaires and the compliance requirements for the final rule, EPA has identified 544 facilities to which the proposed rule is expected to apply.").

The 2014 Rule establishes requirements for existing facilities that: (1) have NPDES permits, (2) use one or more CWISs with a cumulative design intake flow ("DIF") of greater than 2 MGD to withdraw water from waters of the U.S., and (3) use 25 percent or more of the water withdrawn (on an actual intake flow basis) exclusively for cooling water purposes. 40 C.F.R. § 125.91(a). Facilities with CWISs that are subject to CWA § 316(b) that do not meet these criteria must meet § 316(b) requirements established by the permit writer on a case-by-case, BPJ basis. 40 C.F.R. § 125.90(b). EPA's final 2014 Existing Facilities Rule made no mention of hydroelectric facilities in the preamble or regulatory text.

B. The Proposed NPDES General Permit Inappropriately Seeks to Apply § 316(b) Requirements to Hydroelectric Facilities.

The Proposed Permit[13] would apply only to facilities below the 2 MGD and 25 percent cooling water threshold. Proposed Permit Fact Sheet at 28.[14] The Fact Sheet indicates that facilities above the 2 MGD and 25 percent cooling water threshold would have to obtain an individual NPDES permit, and (assuming the individual permit is a federal permit issued by Region 10) an individual § 401 water quality certification, and comply with the comprehensive requirements of the 316(b) Rule. *Id.* For facilities below the 2 MGD and 25 percent cooling

[13] The timing of the Proposed Permit coincides with the announcement that EPA has approved the application by the State of Idaho to administer and enforce the Idaho Pollutant Discharge Elimination System ("IPDES") program regulating discharges of pollutants into waters of the United States under its jurisdiction. 83 Fed. Reg. 27,769 (June 14, 2018). Under a Memorandum of Agreement ("MOA") between the Idaho Department of Environmental Quality and EPA Region 10, EPA will transfer the administration of specific program components to the State over a four-year period. Idaho will assume NPDES permitting and enforcement authority for general permits, such as the proposed general permit for wastewater discharges from hydroelectric generating facilities, by July 1, 2020.

[14] As discussed on page 31, the text of the Proposed Permit is inconsistent with the Fact Sheet and the 401 Water Quality Certification in its discussion of the thresholds facilities must meet to qualify for the permit (i.e., whether facilities above the 2 MGD *and* 25 percent cooling water threshold are ineligible or whether facilities that meet either the 2 MGD *or* 25 percent cooling water thresholds are ineligible). For purposes of these comments, we are assuming that Region 10 intended that facilities that are ineligible for coverage under the Proposed Permit are those facilities that use greater than 2 MGD *and* use 25 percent or more of the water for cooling purposes.

water threshold, the Proposed Permit would set BTA requirements that must be implemented within 180 days of the effective date of the permit, including, for example:

- manage tailrace operations to prevent fish access to the draft tube areas;
- cease or reduce the intake of cooling water whenever withdrawal of source water is not necessary, *i.e.*, during equipment testing or maintenance activities;
- return all observed live impinged fish to the source water to the extent practicable;
- conduct weekly monitoring to identify what species are impinged;
- maintain a physical screening or exclusion technology consistent with NMFS Northwest Region's Anadromous Salmonid Passage Facility Design guidelines; and
- properly operate and maintain CWIS, including any existing technologies to minimize impingement and entrainment.[15]

In addition, permittees also would have to prepare a report to be submitted to Region 10 at least 180 days prior to permit expiration that would include extensive information regarding the CWIS and source waterbody, including, for example:

- if the combined design capacity of all CWISs is greater than 1 MGD, the measures to be taken by the facility to maintain a daily maximum surface water withdrawal of 1 MGD;
- maximum monthly average intake of the CWIS during the previous five years;
- whether the facility withdraws cooling water at a rate commensurate with a closed-cycle cooling system;
- maximum through-screen design intake velocity;
- detailed description of screening and exclusion technology employed to prevent impingement and entrainment at the CWIS; and
- report of the prior five-year results from the required impingement and entrainment monitoring program.[16]

The Fact Sheet states, "EPA will use this information to assess the potential for impingement and entrainment at the CWIS, evaluate the appropriateness of any proposed

[15] Proposed Permit, § IV.C.2.

[16] Proposed Permit, § IV.C.3.

technologies or mitigation measures, and determine any additional requirements to place on the facility's CWIS in the next permit cycle." Proposed Permit Fact Sheet at 28-29. The Idaho Department of Environmental Quality ("IDEQ") has certified that, if the permittee complies with the terms and conditions of the Proposed Permit and the conditions set forth in the water quality certification, "there is reasonable assurance" the covered hydroelectric facilities' discharges "will comply with the applicable requirements" of the CWA and Idaho Water Quality Standards.[17]

The Region provides no analysis or support for applying § 316(b) requirements to hydroelectric facilities. The Fact Sheet demonstrates that the Region relied on and drew heavily from EPA's 2014 Rule in establishing CWIS-related requirements in the Proposed Permit. *See* Proposed Permit Fact Sheet at 28. But nowhere in the Proposed Permit or Fact Sheet does the Region provide any support or independent analysis for the measures it proposes to require for hydroelectric facilities.

III. CWA § 316(b) Does Not Apply to Hydroelectric Facilities.

A. Hydroelectric Generation Facilities Are Not Subject to CWA § 316(b).

By its terms, § 316(b) applies only where EPA establishes standards under §§ 301 and 306 for point sources. Unlike the other facilities to which EPA has applied § 316(b), EPA has not established such technology-based limitations and standards for hydroelectric facilities, nor would it be reasonable to do so given the *de minimis* nature of their discharges. As the United States Supreme Court has recognized, absent clear direction from Congress, courts will view (and agencies should view) with skepticism statutory interpretations that extraordinarily expand regulatory jurisdiction. *Util. Air Regulatory Grp. v. EPA*, 134 S. Ct. 2427, 2444 (2014). Interpreting CWA § 316(b) to apply to hydroelectric generation facilities would be a significant

[17] IDEQ Draft § 401 Water Quality Certification for NPDES Permit Number IDG360000 (Mar. 29, 2018).

expansion of EPA's regulatory jurisdiction and would duplicate other federal and state requirements specifically designed to address these environmental impacts.

The limited legislative history for § 316(b) indicates that Congress did not intend for § 316(b) to apply to hydroelectric facilities. From November 1971 to October 1972, Congress considered various bills that eventually would become the CWA. On September 28, 1972, the conference committee substantially amended § 316, modifying that provision to insert for the first time a provision addressing cooling water intakes structures, and submitted its report for approval by both the House and Senate.[18] During the House of Representatives consideration of the conference report, Rep. Donald Clausen (R-CA1) made the following statement in support:

> Section 316 was originally included in the House-passed water pollution control bill because of the belief that the arguments which justified a basic technological approach to water quality control did not apply in the same manner to the discharges of heat.... [S]team-electric generating plants are the major source of the discharges of heat.... Section 316(b) requires the location, design, construction, and capacity of cooling water intake structures *of steam-electric generating plants* to reflect the best technology available for minimizing any adverse environmental impact.[19]

Rep. Clausen's statement indicates that Congress intended § 316(b) to apply to steam electric generating plants, not hydroelectric generating facilities that harness the power of falling or fast-moving water to drive turbines to produce electricity.[20] In contrast, steam electric power plants heat water into steam that drives the electric-generating turbines, typically requiring considerably more cooling water to safely operate the facility. It is these facilities that were Congress' focus when it promulgated CWA § 316(b).

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[18] *See* H.R. Rep. No. 92-1465, at 68, 137 (Sept. 28, 1972).

[19] House Consideration of the Report of the Conference Committee (Oct. 4, 1972), *reprinted in* 1 A LEGISLATIVE HISTORY OF THE WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972, at 262–64 (1973) (statement of Rep. Clausen) (emphasis added).

[20] We recognize that some U.S. Courts of Appeals have held that § 316(b) applies to other industrial facilities that use cooling water beyond steam electric plants (*e.g.*, iron and steel). *See*, *e.g.*, *Appalachian Power Co. v. Train*, 566 F.2d 451, 457-58 (4th Cir. 1977). But those decisions did not consider whether all facilities that must obtain an NPDES permit are subject to § 316(b).

In promulgating CWA § 316(b), Congress would have understood, as discussed in more detail below, that other statutes and regulations governed consideration of environmental impacts from water diversion structures. For example, Congress would have been well aware that the Federal Power Act ("FPA") licensing process for hydroelectric facilities requires evaluation of environmental impacts and conditions to protect and mitigate impacts to fish and wildlife-related habitat. Congress gave no indication that it intended such facilities to be subject to additional requirements under CWA § 316(b), nor would such requirements have made sense in light of the other mechanisms in place under the FPA. There is no evidence that Congress intended CWA § 316(b) to apply to hydroelectric facilities, and, indeed, the limited legislative history for that provision indicates that Congress intended § 316(b) to address adverse environmental impacts associated with industrial facilities, such as steam electric generating facilities, for which the statute requires EPA to establish nationally applicable effluent limitations guidelines and new source performance standards. There is no basis in the statute for EPA's new interpretation that § 316(b) can apply to hydroelectric facilities.

B. Establishing § 316(b) Requirements for CWISs at Hydroelectric Facilities Would Conflict With and Duplicate Other Federal and State Requirements Already in Place.

The statutory scheme Congress established under the FPA, and other federal statutes, demonstrates Congress' intent that the Federal Energy Regulatory Commission ("FERC") address, through the FERC hydropower licensing process, all issues relating to the use of water by non-federal hydroelectric facilities, including any water quality issues raised by a State CWA § 401 certification.[21]

[21] This section focuses on hydroelectric projects that require FERC authorization because those are the most common facilities for our members. Certain non-federal hydroelectric facilities, such as small projects (5 MW or less) or projects conducted on an existing conduit (*e.g.*, irrigation canal), do not require FERC licensing because those projects would result in minor environmental effects (*e.g.*, projects that involve little change to water flow and

The comprehensive development standard of FPA § 10(a)(1) requires that licensed hydroelectric projects be best adapted to a comprehensive plan for improving or developing a waterway, including, among other uses, for the adequate protection, mitigation, and enhancement of fish and wildlife (including related spawning grounds and habitat). 16 U.S.C. § 803(a)(1). Section 10(a)(1) grants FERC the authority to require the modification of any project and of the plans and specifications of the project works before approval. Thus, to the extent that participating resource agencies, which are actively involved in the licensing process, identify during licensing significant issues relating to impacts from diversion and use of cooling water at hydroelectric facilities, those impacts would be considered by FERC in ensuring that the project will be best adapted to a comprehensive plan.

Section 10(j) of the FPA provides for the full participation of federal and state fish and wildlife agencies in recommending conditions for the protection, mitigation, and enhancement of fish and wildlife resources affected by the development, operation, and management of the hydroelectric project.[22] Such conditions are based on recommendations received pursuant to the Fish and Wildlife Coordination Act from NMFS, the U.S. Fish and Wildlife Service ("FWS"), and state fish and wildlife agencies. As part of the application for a hydroelectric license (or relicense), applicants must submit an environmental report to FERC describing the fish and wildlife that occur within the vicinity of the project and downstream areas affected by the

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use and are unlikely to affect threatened and endangered species), but they are still subject to a similar process and subject to mandatory terms and conditions set by federal and state fish and wildlife agencies and by the Commission. 18 C.F.R. § 4.30. Other federal, non-FERC regulated hydroelectric facilities are generally authorized by Congress and owned by the U.S. Bureau of Reclamation or the U.S. Army Corps of Engineers and in some circumstances must comply with National Environmental Policy Act provisions regarding impacts to aquatic resources associated with operational changes, as well as formally consult with the U.S. Fish and Wildlife Service where federally threatened and endangered species are potentially impacted.

[22] 16 U.S.C. § 803(j)(1).

project, and must identify any federally listed threatened or endangered species.[23] The same report also must describe any measures recommended by consulting fish and wildlife agencies for mitigating such impacts and protecting fish and wildlife.[24]

Additional requirements to evaluate potential impacts to aquatic species exist under the Endangered Species Act ("ESA") and the National Environmental Policy Act ("NEPA"). Pursuant to ESA § 7 and FERC's corresponding regulations, FERC has an obligation to ensure that any project it authorizes is not likely to jeopardize the continued existence of any federally listed endangered or threatened species.[25] To satisfy this requirement, FERC directs project sponsors to engage in informal consultation with NMFS and/or FWS to determine whether the project will impact a federally listed species.[26] Unless NMFS or FWS concludes that the proposed hydroelectric facility is not likely to adversely affect federally listed species, the project sponsor must prepare a Biological Assessment containing the results of detailed surveys, potential impacts, and proposed mitigation to eliminate or minimize such impacts.[27] Where the consulting agency concludes that the project will result in the "incidental take"[28] of listed species, NMFS or FWS will prepare a Biological Opinion that may include reasonable and prudent measures to avoid jeopardy and must include a statement specifying the impact (*i.e.*, the amount or extent of incidental take), and reasonable and prudent measures considered necessary or appropriate to minimize the take of listed species.[29] Through this process, FERC will

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[23] 18 C.F.R. §§ 4.51(f), 4.41(f).

[24] *Id.*

[25] 16 U.S.C. § 1536.

[26] 18 C.F.R. § 380.13.

[27] *See* 18 C.F.R. § 380.13(b).

[28] "Incidental take" refers to "takings that result from, but are not the purpose of, carrying out an otherwise lawful activity." 50 C.F.R. § 402.02.

[29] *See* 16 U.S.C. § 1536(b)(4); *see also* 50 C.F.R. § 402.15(i).

determine, in consultation with federal fish and wildlife agencies, which conservation and mitigation measures should be implemented to minimize impacts. In other words, the ESA process frequently results in the imposition of measures to protect listed species that might be impacted by operations of hydroelectric facilities, including the diversion of cooling water.

NEPA review requires the development by FERC of a Finding of No Significant Impact ("FONSI"), an Environmental Assessment ("EA"), or an Environmental Impact Statement ("EIS") for a project. Entrainment, impingement, and other impacts on fish and wildlife are analyzed in these environmental documents. For example, within the EA for a hydroelectric project in Arkansas, FERC concluded that "[b]ased upon [Arkansas Game and Fish Commission] observations, current levels of turbine entrainment and mortality of fish is [sic] not considered to be a significant issue at these projects."[30] Likewise, comprehensive entrainment studies were developed as part of the application process for the Catawba-Wateree and Yadkin-Pee Dee, hydroelectric projects spanning the Carolinas. The EIS for the Catawba-Wateree project found that "entrainment does not appear to adversely affect survival and growth of young of target sport and forage species populations,"[31] and the EIS for the Yadkin-Pee Dee project found that there is "no indication that entrainment is having significant adverse effects on resident fish populations, because project reservoirs and riverine reaches support robust fish populations and an excellent sport fishery."[32] Similarly, for the Smith Mountain Hydroelectric Plant, a pumped storage facility in Virginia, an entrainment study qualitatively evaluated entrainment for selected species based on reservoir and turbine intake characteristics, water

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[30] FERC, Environmental Assessment for Hydropower License, Project No. 271-062, at 66 (Dec. 2001).

[31] FERC, Final Environmental Impact Statement for Hydropower License, Project No. 2232, at 178 (July 2009).

[32] FERC, Final Environmental Impact Statement for Hydropower License, Project No. 2206, at 138 (Apr. 2008).

velocity and swim speed data, and life history characteristics.[33] FERC concluded in the EIS for the project that the "loss of individual fish from entrainment and mortality is not expected to result in any substantial effects to the fishery at the Project."[34] The analyses above address entrainment associated with all water passing through the projects, including the enormous amounts of water that go through the turbines for electricity generation. While these studies generally do not focus on entrainment specific to the small pipes and other structures – often within or off of the penstocks – that various hydroelectric facilities use to divert water for service water and cooling purposes, withdrawals and entrainment impacts from these cooling water diversions would be exceptionally smaller. In addition, FERC frequently addresses the issue of fish impingement and entrainment by requiring licensees to screen their intakes to prevent or minimize fish from entering the penstock, which can eliminate or reduce the possibility of impingement or entrainment during the diversion of water from the penstock for cooling purposes.

Furthermore, CWA § 401 provides states broad authority to impose conditions as part of state-issued water quality certificates in the context of the licensing and relicensing of projects. FERC may not issue a license unless the state has either issued or waived the water quality certificate. States have used this authority to impose conditions related to fisheries, aesthetics, recreation, and more.[35] Such conditions are considered "mandatory," meaning that FERC has no discretion but to include them in a license.

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[33] *See* FERC, Final Environmental Impact Statement for Hydropower License, Project No. 2210, at 119-126 (Aug. 2009).

[34] *Id.* at 126.

[35] *See, e.g., S.D. Warren Co. v. Maine Bd. of Envtl. Prot.*, 547 U.S. 370 (2006) (holding FERC-licensed dams must comply with state certification that required operator to maintain stream flow and allow passage for certain fish and eels).

In accordance with the authorities described above, fish and wildlife agencies often recommend protection, mitigation, and enhancement measures to offset any known impacts of hydroelectric facilities for aquatic species. In some cases, FERC license conditions may go further than the 2014 Rule would to minimize adverse environmental impacts associated with hydroelectric operations because they can include habitat restoration which, although not allowed as BTA for steam electric and manufacturing facilities captured under the Existing Facilities Rule, serves to provide habitat for individual species, life stages (such as spawning and rearing of young), or entire communities of aquatic organisms affected by hydroelectric operations. Thus, the FERC licensing process already provides for measures to minimize adverse environmental impacts of hydroelectric operations and may, at times, be more stringent than § 316(b) requirements. Any imposition of § 316(b) requirements, either through application of the 2014 Rule or a case-by-case BPJ determination, would be duplicative of existing federal and state requirements already in place. As the Alabama Department of Environmental Management ("ADEM") has recognized, "[t]he purpose of 316(b) of the [CWA] is to reduce mortality to fish and other aquatic organisms impacted by cooling water intake structures," but, for hydroelectric facilities, "the impacts to aquatic organisms are already addressed" and "have been extensively studied under the [NEPA] and [FERC] regulatory frameworks and subsequently granted 401 certifications."[36]

IV. EPA's 2014 Rule for Existing Facilities Did Not Consider Hydroelectric Facilities.

Even if CWA § 316(b) were applicable to hydroelectric facilities, which it is not, the Region's proposed BPJ requirements are arbitrary and capricious because the Region borrowed from and relies on a rule that EPA expressly stated did not apply to hydroelectric facilities and

[36] *See* ADEM General Permit Rationale, Hydroelectric Facilities ALG360000, at 3 (Aug. 18, 2015).

that the Agency adopted without any consideration of the technical feasibility or cost of application to hydroelectric facilities.

A. EPA Has Never Provided Notice or an Opportunity to Comment on the Applicability of § 316(b) Requirements to Hydroelectric Facilities.

Under the APA, 5 U.S.C. § 553(b)(3), an agency must publish in the *Federal Register* a notice of proposed rulemaking, which "shall include . . . either the terms or substance of the proposed rule or a description of the subjects and issues involved." After the notice is published, the agency must "give interested persons an opportunity to participate in the rule making through submission of written data, views, or arguments." 5 U.S.C. § 553(c). The APA's notice-and-comment mandate is "designed (1) to ensure that agency regulations are tested via exposure to diverse public comment, (2) to ensure fairness to affected parties, and (3) to give affected parties an opportunity to develop evidence in the record to support their objections to the rule and thereby enhance the quality of judicial review." *Int'l Union, United Mine Workers of America v. Mine Safety and Health Admin.*, 407 F.3d 1250, 1259 (D.C. Cir. 2005). These procedures "ensure that the broadest base of information would be provided to the agency by those most interested and perhaps best informed on the subject." *Phillips Petroleum Co. v. Johnson*, 22 F.3d 616, 620 (5th Cir. 1994).

To ensure regulated entities have fair notice, "the final rule the agency adopts must be a 'logical outgrowth' of the rule proposed." *Long Island Care at Home, Ltd. v. Coke*, 551 U.S. 158, 174 (2007). Under this principle, the law asks "whether the affected party 'should have anticipated' the agency's final course in light of the initial notice." *Covad Commc'ns. Co. v. FCC*, 450 F.3d 528, 548 (D.C. Cir. 2006) (citation omitted). While a final rule need not be an exact replica of the proposed rule, "if the final rule deviates too sharply from the proposal,

affected parties will be deprived of notice and an opportunity to respond to the proposal." *Small Refiner Lead Phase-Down Task Force v. EPA*, 705 F.2d 506, 547 (D.C. Cir. 1983).

As explained above, prior to the implementation of the 2014 Rule, there had never been any indication from EPA or Congress that CWA § 316(b) could apply to hydroelectric facilities. Moreover, there was no way to anticipate from the proposed Existing Facilities Rule that EPA would apply the technology-based standards to hydroelectric facilities. Hydroelectric facilities had no notice that those facilities could be subject to new NPDES requirements as a result of the 2014 rulemaking, nor were they provided an opportunity to comment on the many ways in which technologies that EPA evaluated for steam electric power and manufacturing plants cannot be considered BTA for hydroelectric facilities. In the preamble to the proposed rule for existing facilities, EPA explicitly stated that withdrawals from hydroelectric facilities were not meant to be addressed by the Existing Facilities Rule:

> Given the diversity of industrial processes across the U.S., there are many other industrial uses of water not intended to be addressed by today's proposed rule . . . Warming water at liquefied natural gas terminals, and *hydro-electric plant withdrawals for electricity generation are not cooling water uses and are not addressed by today's proposal* . . . .

76 Fed. Reg. at 22,190 (emphasis added).

In light of EPA's history of *not* applying CWA § 316(b) to hydroelectric facilities and because EPA's explicit statements confirmed that hydroelectric facilities would not be covered by the Existing Facilities Rule, private and public entities that own or operate hydroelectric facilities did not provide comments to address the potential impacts of the Existing Facilities Rule's proposed requirements.[37] Applying the Existing Facilities Rule to hydroelectric facilities, therefore, cannot be a logical outgrowth of the proposed rule. Thus, any attempt now by EPA to

[37] There is no reference to hydroelectric facilities in EPA's 467-page response to comments document. Response to Comments Document for the Final 316(b) Existing Facilities Rule (May 19, 2014) (EPA-HQ-OW-2008-0667-3679).

apply the Rule's requirements to hydroelectric facilities, which has been done only on rare occasions through post hoc determinations for particular facilities[38] and now in the Proposed Permit, is contrary to the APA's requirements for fair notice and opportunity for comment.

B. EPA Did Not Consider Technologies for Hydroelectric Facilities or Evaluate the Potential Impacts of Applying the Rule's BTA Standards to Hydroelectric Facilities.

EPA's final 2014 Rule and preamble provide no discussion of the applicability of § 316(b) or the Rule to hydroelectric facilities. In fact, the administrative record for the 2014 Rule is replete with indications that EPA did not consider impacts to hydroelectric facilities when evaluating potential technologies or the associated costs and benefits. For example, in the Economic Analysis for the final 2014 Rule, EPA stated that "[t]he final rule is only relevant for power generators that use substantial amounts of cooling water, and …[o]nly prime movers with a *steam-electric generating cycle* use large enough amounts of cooling water to be subject to the final rule."[39] The analysis goes on to describe steam electric facilities as those generating units

[38] In one of the few instances where EPA has asserted that § 316(b) and the 2014 Rule apply to hydroelectric facilities, it is clear that EPA's determination was made behind the scenes, well after the 2014 Rule was promulgated, and without a notice-and-comment rulemaking that evaluated the potential implications of such a determination. The 2016 NPDES Permit Fact Sheet for the Smith Mountain Hydroelectric Plant in Virginia stated, "Significant discussion was held during this reissuance regarding the applicability of CWA section 316(b). [The applicant's] position is that hydropower stations are not subject to section 316(b). However, after consultation with EPA, a determination was made that the facility is subject to CWA 316(b) and the [Existing Facilities] Rule. The determination was that § 316(b) 'applies' to hydropower facilities if waters of the U.S. are withdrawn and used for cooling purposes." VPDES Permit Program Fact Sheet, Permit No. VA0088765, at ¶ 30 (June 13, 2016). Other states that have considered the issue have determined that § 316(b) does not apply to hydroelectric facilities, *see, e.g.,* ADEM General Permit Rationale, Hydroelectric Facilities ALG360000 (Aug. 18, 2015) (ADEM agrees that the § 316(b) rule is "not applicable" to hydroelectric facilities), or have continued to issue NPDES permits for hydroelectric facilities without § 316(b) requirements, *see, e.g.,* South Carolina Department of Health and Environmental Control, NPDES General Permit for Hydroelectric Generating Facilities, Permit No. SCG360000 (May 15, 2015); North Carolina Department of Environment and Natural Resources, NPDES General Permit No. NCG50000 (Oct. 1, 2015).

[39] Economic Analysis for the Final 316(b) Existing Facilities Rule at 2A-4 (May 2014) (emphasis added) ("2014 Economic Analysis").

that are fueled by "coal, gas, oil, waste, nuclear, geothermal, and solar steam."[40] EPA does not include hydroelectric facilities in its analysis of the economic impact of the Rule on electric generation units, nor does EPA analyze the economic impact of the rule on hydroelectric facilities, in particular.[41] Likewise, in the Technical Development Document for the 2014 Rule, EPA includes the following exhibit that provides the estimated number of facilities that would be subject to the 2014 Rule by fuel type and prime mover category, but the table does not include hydroelectric facilities:

Exhibit 4-26. 316(b) electric power facilities by plant type and prime mover

Plant type[a]	Prime mover	Number of 316(b) electric generators[b,c]
Coal steam	Steam turbine	342
Gas	Steam turbine	73
Nuclear	Steam turbine	56
Oil	Steam turbine	29
Other steam	Steam turbine	25
Total steam	Steam turbine	525
Combined cycle	Combined cycle	33
Total		559

[a] Facilities are listed as steam electric if they have at least one steam electric generating unit.
[b] Facility counts are weighted estimates generated using the original 316(b) survey weights.
[c] Individual values do not sum to reported total due to rounding as the result the application of statistical weights.
Sources: U.S. EPA, 2000; U.S. DOE, 2007 (GenY07); U.S. EPA Analysis, 2010

2014 TDD Exhibit 4-26.

Similarly, EPA's benefit analyses did not consider hydroelectric facilities. To evaluate the benefits of the 2014 Rule's requirements, EPA extrapolated data from 98 model facilities based on information EPA received in the 2000 ICR.[42] In its 2000 ICR, however, EPA did not request information from any hydroelectric facilities. EPA ultimately narrowed its research

[40] *Id.*; *see also* Technical Development Document for Final Section 316(b) Existing Facilities Rule at 4-23 (May 19, 2014) ("2014 TDD") ("Only prime movers with a steam-electric generating cycle use large enough amounts of cooling water to fall under the scope of the proposed rule.").

[41] In fact, the only discussion of hydroelectric facilities in EPA's Economic Analysis is a general description of hydroelectric facilities' contribution to electricity generation. *See* 2014 Economic Analysis at 2A-3.

[42] *See* Benefits Analysis for the Final Section 316(b) Existing Facilities Rule at 3-5 (May 2014).

activities to focus on traditional utilities, nonutility power producers, and four other industrial categories that utilize large quantities of cooling water. "Traditional utilities and nonutility power producers that use cooling water were further limited to those plants that generate electricity by means of steam as the thermodynamic medium (steam electric) because they are associated with large cooling water needs."[43] Therefore, hydroelectric facilities, which do not generate electricity through the use of steam, were excluded from EPA's original data request, which was later used to support EPA's analysis of the Existing Facility Rule's benefits.

In fact, EPA concluded that "[u]nits with water turbines, or 'hydroelectric units,'... do not use a steam loop and do not use cooling water ...."[44] As Region 10 now appears to understand, hydroelectric facilities occasionally do use cooling water, although they do so in small amounts, and their use of cooling water certainly was not the focus of the 2014 Rule.

If EPA had actually considered the technical feasibility and cost for application requirements and any technology and associated monitoring requirements for hydroelectric facilities, it would have understood that what is BTA for steam electric power and manufacturing plants is not necessarily BTA for hydroelectric facilities. EPA previously has recognized that a different BTA may be appropriate for other types of facilities with CWISs. For example, EPA determined that, for existing offshore oil and gas platforms, no retrofit technology was BTA. EPA studied the facilities and "could not identify any technologies (beyond the protective screens already in use) that are technically feasible for reducing impingement or entrainment in such existing facilities." 79 Fed. Reg. at 48,310. As discussed in more detail in Section IV.B below, there are similar challenges for hydroelectric facilities.

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[43] Information Collection Request, Detailed Industry Questionnaires: Phase II Cooling Water Intake Structures & Watershed Case Study Short Questionnaire at 4 (Aug. 18, 1999).

[44] 2014 TDD at 4-22.

EPA cannot impose § 316(b) requirements on hydroelectric facilities without engaging in proper notice-and-comment rulemaking that evaluates the availability and feasibility of potential technologies for hydroelectric facilities. Region 10's Proposed Permit and Fact Sheet do not fulfill this requirement. Accordingly, it is unlawful for Region 10 to impose on hydroelectric facilities CWA § 316(b) requirements – whether they are based on BPJ determinations or the 2014 Rule – without following the necessary procedures or conducting this type of evaluation.

V. Even if § 316(b) Did Apply to Hydroelectric Facilities, Which it Does Not, the Requirements of the 2014 Rule Are Not Appropriate for Such Facilities, Which Are Fundamentally Different From Facilities Covered by the Rule.

The requirements that EPA established in the 2014 Rule are not appropriate for hydroelectric facilities, which are fundamentally different from the steam electric power and manufacturing plants EPA considered in that rulemaking.

As discussed above, EPA did not consider hydroelectric facilities in establishing BTA in its 2014 Rule. EPA explained in the preamble to the 2014 Rule that, to establish BTA for the facilities covered by the Rule, EPA considered: "the availability and feasibility of various technologies," "costs associated with these technologies," the technologies' economic impacts, "effectiveness of these technologies in reducing impingement mortality and entrainment," and additional factors, such as "location, age, size, and type of facility." 79 Fed. Reg. at 48,328. For this analysis, EPA made a number of assumptions based on data and information from steam electric power plants and manufacturing plants that do not take into account technology costs or feasibility for hydroelectric facilities.[45]

[45] For example, in evaluating impingement data and performance standards, EPA relied on 26 impingement mortality data sets at 17 facilities, none of which included hydroelectric facilities. 79 Fed. Reg. at 48,323; 2014 TDD Exhibit 11-3. As another example, in the final rule, EPA adjusted its assumptions for costs of modified traveling screens with fish returns in response to feedback that its proposal had underestimated those costs. 79 Fed. Reg. at 48,324. The adjustments EPA made in its evaluation of technology costs included: to correct its misplaced assumption that modified traveling screens were available at most facilities, EPA assigned higher cost technologies (*e.g.*, larger intakes, wedgewire screens with through-screen design velocities of 0.5 fps) for intakes that use passive

The assumptions that EPA made for the facilities it considered in its 2014 Rule do not necessarily apply for hydroelectric facilities. There are numerous different configurations for hydroelectric facilities and, in particular, their pipes and structures that divert cooling water. Nearly every facility has unique, location-specific design attributes to take maximum advantage of the hydraulics of that unique physical location. For example, some hydroelectric facilities have a hole bored through the penstock in which a perforated flange is used to attach a small pipe used to gravity feed service and cooling water equipment. Some hydroelectric facilities have pipes that come off the scroll case. Others have separate pipes that come off the face of the dam. For these three configurations, water that is gravity- or pressure-induced feeds through the pipe to cool and service the equipment. Other facilities have separate intake pump houses upstream of the powerhouse. For those facilities, there is a distinct and separate intake used for service water and cooling purposes. Pumped storage facilities pump water from lower reservoirs to higher elevation reservoirs during times of low electric demand and then release water from the upper reservoir to drive turbines during periods of high electric demand. In one pumped storage facility, cooling water is drawn from the cavity between the inner and outer walls of the power house, while service water is drawn from a single intake at the tailrace of the plant.

Given the wide range of configurations for hydroelectric facilities and different processes for diverting water for cooling, the technologies that EPA found to be the best available technologies and sampling requirements for steam electric power plants and manufacturing plants are not necessarily appropriate or practical for hydroelectric facilities.

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screens; EPA increased capital costs for the fish return component and included additional costs for those with particularly difficult circumstances, such as very long intake canals and submerged offshore intakes. *Id.*; 2014 TDD at 8-2 to 8-6 (explaining EPA's model facility approach and modifications to the cost tool). EPA did not consider application of the technology to hydropower facilities.

For example, at many hydroelectric facilities, conducting impingement or entrainment sampling at the pipe or structure taking in cooling water would be very difficult, or even unsafe, due to turbulence. Sampling equipment may not be able to withstand water flows and forces and could break away, potentially damaging the facility.

In addition, many of the impingement technology options that are established as BTA in the 2014 Rule would not be feasible at most hydroelectric facilities. For example, one of the impingement options is to use a maximum 0.5 feet per second through-screen design velocity, 40 C.F.R. § 125.94(c)(2), but for many hydroelectric facilities, the only way to retrofit an intake pipe within the penstock to meet that through-screen design velocity would be to increase the size of the intake opening, which in some cases would require dam reconstruction and could actually increase entrainment because of the increase in the volume of water passing through the intake. Similarly, another impingement option is to operate an intake structure with a maximum through-screen velocity of 0.5 feet per second, § 125.94(c)(3), but it would be impossible to measure the actual velocity at the intake for most hydroelectric facilities because the magnitude and force of the water is so great as it is going through the penstock that no monitoring equipment could be located near the intake. Nor would it be feasible to install modified traveling screens, § 125.94(c)(5), on the small pipes that are used by many hydroelectric facilities to take in cooling water. At least three of the impingement options, §§ 125.94(c)(5)-(7), require an impingement technology performance optimization study, which would be very difficult, if not impossible, for many hydroelectric facilities that would not be able to conduct impingement sampling at the intake.

Indeed, the 2014 Rule's requirements would not be necessary in most cases because the rates of impingement and entrainment would be so low that additional controls would not be

warranted. Some hydroelectric facilities have in place screens to prevent debris of a certain size from entering the penstock (and therefore the cooling water pipe), and at many facilities, the water passes through a strainer before being used for cooling purposes. Some of these strainers are backwashed to a plant sump. In our members' experience, fish are rarely (if ever) observed in strainer baskets or in backwash to the plant sump. Moreover, for many hydroelectric facilities, due to the high velocity and volume of water passing through the penstock and by the entrance to the intake, the rates of impingement would be so low that additional impingement controls would be useless. The same is true for entrainment at many of these facilities. For hydroelectric facilities, the *de minimis* exception for impingement established in the 2014 Rule, 40 C.F.R. § 125.94(c)(11), would be applicable more often than not. And the fact that there is not a *de minimis* exception for entrainment in the 2014 Rule would create issues for many hydroelectric facilities that would have no way of further minimizing the already very minor rates of entrainment.

EPA clearly did not consider hydroelectric facilities when it was establishing the requirements under the 2014 Rule. As explained above, such requirements are not appropriate or feasible for hydroelectric facilities, which are fundamentally different from facilities covered by the 2014 Rule.

VI. The § 316(b) Measures Required in the Proposed General Permit Are Inappropriate for Hydroelectric Facilities.

Even if § 316(b) applied to hydroelectric facilities, which it does not, the measures that Region 10 proposes as BTA in the Proposed Permit are inappropriate for the hydroelectric facilities to which the Proposed Permit, if finalized, would apply. As Region 10 acknowledges,

each generating facility is unique in its location, physical layout, and operational pattern.[46] The documentation Region 10 has supplied provides no information on the specific attributes of the "intake structures" used to supply cooling water used by the hydroelectric facilities to which any final permit would apply. Indeed, the Fact Sheet reflects no attempt to characterize or consider the wide range of variation among existing cooling water intakes at hydroelectric facilities. That variation is important because site-specific factors may make it difficult or impossible for many facilities to comply with some or all of the proposed requirements.

The Region also made no effort to assess whether those intakes, as currently configured and operated, are causing any meaningful environmental impacts not already minimized in the licensing and NEPA review process. It is difficult to understand how Region 10 could have exercised its BPJ that the intake of cooling water at hydroelectric facilities requires further control without first collecting at least some information from which to evaluate whether the diversion of relatively small amounts of water that otherwise would flow through the facility were likely to cause any meaningful incremental environmental impacts. Even if it were appropriate to apply § 316(b) to these facilities (which NHA and UWAG believe it is not), the exercise of BPJ for existing facilities requires at least some understanding of the location, design, construction, and capacity of the "intake structures" involved and the environmental impacts occurring. Region 10 put the cart before the horse, imposing new "BTA" requirements without first evaluating the attributes of the facilities in question and determining whether or not they already have minimized adverse environmental impacts.

Region 10 also failed to identify the technologies, measures, procedures, and methods that it anticipates facilities would use to meet the requirements imposed by the permit. Nor did

[46] EPA Region 10, Biological Evaluation of the NPDES General Permit for Hydroelectric Facilities Within the State of Idaho, Permit Number IDG360000, at 8 (Feb. 2018).

Region 10 consider how the BTA requirements it seeks to impose may overlap or conflict with FERC license conditions. As discussed below, many of the proposed requirements dictate an outcome (like returning fish to the waterbody or managing tailrace operations to prevent fish access to draft tube areas) without any discussion of what technology or other measures the Region expects the facility to use to accomplish that outcome. The record is equally devoid of any assessment of the feasibility and costs of using whatever technologies, procedures, or methods might be needed to satisfy those requirements, or the level of performance or environmental benefits likely to be achieved. Indeed, some of the measures Region 10 has proposed could be read to apply to hydroelectric facilities as a whole, including parts of the facility (e.g. tailrace) that are not part of the process for diverting cooling water.

The availability and cost of specific technologies and measures, the impact of those costs on affected facilities, and the environmental benefits of requirements based on those technologies are all important factors that EPA acknowledged it needed to consider before establishing its nationally applicable § 316(b) regulations for facilities withdrawing cooling water above the applicable thresholds. EPA also considered feasibility, cost, and benefits in establishing permit application requirements, including those dealing with biological monitoring and other data collection and analysis, reporting, and recordkeeping. Based on its consideration of those factors, EPA was unable to justify imposing any specific BTA technology requirements on facilities below the applicable flow threshold or any uniform application requirements for entrainment for facilities with "actual intake flows"[47] at or below 125 MGD. Yet Region 10

[47] Actual Intake Flow ("AIF") "means the average volume of water withdrawn on an annual basis by the cooling water intake structures over the past three years. After October 14, 2019, Actual Intake Flow means the average volume of water withdrawn on an annual basis by the cooling water intake structures over the previous five years. Actual intake flow is measured at a location within the cooling water intake structure that the Director deems appropriate. The calculation of actual intake flow includes days of zero flow. AIF does not include flows associated with emergency and fire suppression capacity." 40 C.F.R. § 125.92(a).

proposes to impose a host of new § 316(b) requirements without identifying the technologies on which they are based, determining that they are in fact available for the facilities in question, and evaluating their costs and benefits. In particular, the Region failed to consider the important social costs (*e.g.* energy reliability, renewable electricity generation) of imposing new requirements.

In fact, it would be very difficult for many hydroelectric facilities to comply with the requirements outlined in the Proposed Permit. In some cases (*e.g.*, weekly monitoring, returning impinged fish to source water), the requirements Region 10 has proposed are far more onerous than those EPA concluded should apply only to facilities with design flows greater than 2 MGD and actual intake flows greater than 125 MGD. Moreover, even if some facilities could meet some of those requirements, the costs likely would far exceed any plausible environmental benefits.

UWAG and NHA provide the following specific comments on the Proposed Permit's BTA requirements:

- The 2014 Rule establishes requirements for existing facilities that: (1) have NPDES permits, (2) use one or more CWISs with a cumulative DIF of greater than 2 MGD to withdraw water from waters of the U.S., **and** (3) use 25 percent or more of the water withdrawn (on an actual intake flow basis) exclusively for cooling water purposes. 40 C.F.R. § 125.91(a). Facilities with CWISs that are subject to CWA § 316(b) that do not meet these criteria must meet § 316(b) requirements established by the permit writer on a case-by-case, BPJ basis. *Id.* § 125.90(b). The Fact Sheet and Section 401 Water Quality Certification state that the Proposed Permit would cover facilities that fall below the threshold of "2 MGD or less **and** less than twenty-five percent used exclusively for cooling . . . ." Proposed Permit Fact Sheet at 28 (emphasis added); *see also* Section 401 Water Quality Certification at 1. The Proposed Permit, however, states that facilities are ineligible for coverage and must apply for an individual NPDES permit if the facility "uses or proposes to use one or more [CWISs] with a [DIF] of greater than 2 [MGD] **or** the facility uses 25 percent or more of the water it withdraws for cooling water purposes on an average monthly basis." Proposed Permit at 8 (emphasis added). Although, as explained throughout these comments, NHA and UWAG do not believe CWA § 316(b) or the 2014 Rule are applicable to hydroelectric facilities even on a case-by-case BPJ basis, if Region 10 plans to rely on the 2014 Rule, it must be consistent throughout the

Proposed Permit and supporting documents, and clarify that facilities that are ineligible for coverage under the Proposed Permit are those facilities that use greater than 2 MGD **and** use 25 percent or more of the water for cooling purposes.

- 2(a): The Proposed Permit would require permittees to "manage the intake operations to minimize injury to resident fish and other aquatic species in the river," but the Region provides no analysis of the range of existing hydroelectric cooling water intake operations and how their operations could be managed to minimize injury to resident fish and other aquatic species.

- 2(b): The Proposed Permit would require facilities to "manage tailrace operations to prevent fish access to the draft tube areas to minimize injury of fish and other aquatic species." The tailrace and draft tube, however, are not subject to EPA's NPDES permitting authority. Moreover, the cooling water piping may not exist in the draft tube, but rather at the downstream face of the power plant, making managing the tailrace operations at the draft tube ineffective for protecting fish. Because of the geometry and physics of this system, the potential for fish impingement and entrainment is very low, and monitoring for fish is nearly impossible. To the extent that fish access to the tailrace and associated injury from contact with turbine runners constituted a significant resource issue, the existing FERC licensing process would be adequate to fully address the impacts in consultation with fish and wildlife agencies.

- 2(c): The Proposed Permit would require permittees to "cease or reduce the intake of cooling water whenever withdrawal of source water is not necessary," but the Region provides no analysis of, or evidence for, the feasibility or efficacy of ceasing or reducing the intake of cooling water at these hydroelectric facilities.

- 2(d): The Proposed Permit would require permittees to "return all observed live impinged fish to the source water to the extent practicable." The Region provides no analysis that impingement occurs, or can even be discerned, at all types of cooling water intakes or that screening fish and returning fish to the source water is technically feasible.

- 2(e): The Proposed Permit directs permittees not to spray impinged fish or invertebrates with chlorinated water. EPA provides no analysis of, or evidence for, the feasibility or efficacy of restricting the use of chlorinated water at hydroelectric cooling water intakes for minimizing adverse effects of impingement and entrainment.

- 2(f): The Proposed Permit would require permittees to "design an impingement and entrainment monitoring program," and the monitoring is to be conducted "at least weekly." However, as explained above, conducting impingement or entrainment sampling at the pipe or structure taking in cooling water would be very difficult, and even unsafe. Moreover, in the FERC licensing process, study and monitoring needs are determined in consultation with federal and state fish and wildlife agencies. The FERC process is robust and sufficient for determining whether monitoring may be justified and is technically feasible for evaluating fish impingement and entrainment at the cooling water intake.

- 2(g): The permittee is directed to retain the results of this monitoring program on site "for inspection and for submission to EPA as required in Part 4(l) of this Section," but the reference to 4(l) is confusing, given this section (*i.e.*, IV.C) contains no Part 4(l).

- 2(h): The Proposed Permit would require permittees to maintain physical screening or exclusion technology consistent with the guidelines of NMFS Northwest Region's Anadromous Salmonid Passage Facility Design. These guidelines, however, are designed based on physical screening and exclusion technology for the hydroelectric turbines and the bypass operations and are not likely to be feasible at many of the cooling water intakes. Region 10 could not require such technologies for the turbines themselves, which are outside the scope of EPA's NPDES authority.

- 2(i): The Proposed Permit would require the permittee to "operate and maintain the CWIS including any existing technologies used to minimize impingement and entrainment," but it is not clear what technologies could be used at hydroelectric facilities to minimize impingement and entrainment. The Region provides no analysis or explanation.

The information report required under the Proposed Permit's section IV.C.3 has requirements that are excessive and, in some instances, inconsistent with the section IV.C.2 BTA requirements. UWAG and NHA provide the following specific comments on the Proposed Permit's CWIS report requirement:

- 3(d): Reporting requirement 3(d) refers to measures to be taken to maintain a daily maximum surface withdrawal of 1.0 MGD, but such measures are not listed among the BTA requirements.

- 3(e): EPA requests maximum monthly average intake data during the previous five years, but these data may not be collected at hydroelectric cooling water intakes because the intake volume is so small.

- 3(f): Reporting requirement 3(f) refers to whether the facility withdraws cooling water at a rate commensurate with a closed-cycle cooling system without any analysis or explanation as to how this might be relevant to the operation of small cooling water intakes at hydroelectric facilities.

- 3(o): Reporting requirement 3(o) for a report of the five-year results from the impingement and monitoring program called for in Part 2(f) is not supported by any analysis of the need for, technical feasibility, or costs of conducting such a monitoring program. Again, monitoring would not be technically feasible at many facilities, and EPA has not identified how the monitoring information would be applied to future BTA determinations.

VII. EPA Should Clarify Certain Other Requirements in the Proposed General Permit.

In addition to the § 316(b)-related measures addressed above, there are a number of discharge-related provisions in the Proposed Permit that require clarification and/or revision, including the following:

- Eligibility for Permit Coverage: On page 8, the Proposed Permit states that a facility is ineligible for coverage if "[t]he facility is new or has expanded since July 1, 2011." The Fact Sheet states, however, that facilities are not covered by the Proposed Permit if they "are new or have expanded *their discharge* since July 1, 2011." Fact Sheet at 19 (emphasis added). EPA should clarify whether a facility is excluded if it has expanded since July 1, 2011, or whether it is excluded only if the discharge has expanded since July 1, 2011. Similarly, the Proposed Permit states that a facility would be ineligible when "[a] Water Quality Management Plan or Total Maximum Daily Load (TMDL) containing requirements applicable to such a point source is approved," Proposed Permit at 8, but the Fact Sheet states that this applies to facilities "with wasteload allocations from a TMDL for pH, oil, and grease and/or temperature" would be ineligible. Fact Sheet at 19. EPA should clarify whether a facility is ineligible if it has a wasteload allocation as a result of a TMDL for some, but not all of the discharges, or whether a facility could be eligible for only those discharges that do not already have an approved wasteload allocation.

- Existing Measures to Prevent Release of Oil and Grease: In accordance with their FERC license and related requirements, most hydropower producing facilities in the state of Idaho are currently required to maintain procedures in place pursuant to a Spill Prevention Control and Countermeasure (SPCC) and Emergency Action Plan (EAP). Each of these plans is in place in order to protect against any accidental release of oil and grease into a water of the United States. It is unclear, therefore, what additional benefit would derive from the Proposed Permit's Best Management Practices (BMP) Plan requirement.

- BMP Plan Notification: Under the Proposed Permit's "Schedule of Submissions," the permittee must provide EPA with written notification that the BMP Plan has been implemented within 180 days after the effective date of the permit. Proposed Permit at 2. This schedule also indicates that the permittee must notify EPA that the BMP Plan has been implemented within 90 days after authorization to discharge under the General Permit. *Id.* Can EPA guarantee that the permittee will have authorization to discharge within 90 days of the effective date of the permit to allow the permittee to satisfy these obligations on time? Moreover, the 180-day period specified on page 2 of the Proposed Permit is inconsistent with the requirement on page 20 that the permittee submit written notice to EPA and IDEQ that the BMP Plan has been developed and implemented within 90 days of the effective date of the permit. EPA should correct page 20 to use the 180-day period previously specified.

- BTA Notification: Likewise, pursuant to section IV.C.2, facilities withdrawing cooling water must implement BTA within 180 days of the effective date of the permit. Proposed

Permit at 20. Can EPA guarantee that the permittee will have authorization to discharge within enough time to implement BTA within 180 days of the permit's effective date?

- BMP Plan Shield: Part IV.B.5 of the proposed permit would require the permittee to implement BMPs or other measures that "ensure" compliance with a host of vaguely or inconsistently stated objectives. For example, Section IV.B.5(a) would require BMPs to "ensure" that oil, grease, and hydraulic fluids from "all sources" "do not enter the river," apparently in any amount, and regardless whether this would be feasible or necessary to meet water quality standards. Proposed Permit at 21. Yet, section IV.B.5(c) would require only BMPs that "*minimize* the leaking of hydraulic oil or other oils." *Id.* (emphasis added.) As another example, section IV.B.5(d) would require the permittee to "reduce" its reliance on lubricants that come into contact with river water, and sections IV.B.5(e) and IV.B.5(j) would require a "preference" for "environmentally acceptable lubricants" and PCB-free lubricants, paint, and caulk, but no criteria are specified in the permit for evaluating what reductions are required or for exercising these preferences. *Id.* at 21-22. Requirements such as these leave permittees unfairly exposed to agency enforcement actions and citizen suits even when the permittees have complied with them in good faith. To prevent this, the requirements should be stated more clearly and objectively, and the permit should include a provision that a permittee's compliance with the BMPs specified in its required BMP Plan constitutes compliance with section IV.B of the permit. Such a "plan shield" would be consistent with NPDES permit requirements because section IV.B.3(c) authorizes EPA to require changes in the BMP Plan "at any time" if EPA determines that the BMP Plan does not meet the minimum requirements of section IV. But allowing a permittee to rely on the BMPs in its BMP Plan unless and until EPA directs changes in those BMPs would prevent the permittee from being unfairly subject to an enforcement action based on second-guessing the adequacy of the BMPs that it has selected in good faith to comply with the permit's vaguely worded BMP requirements.

- NOI Requirements for Facilities Discharging to § 303(d) Listed Waters: According to the Proposed Permit, facilities that would like coverage under the general permit must submit their initial application or Notice of Intent ("NOI") within 90 days after the effective date of the permit. Proposed Permit at 2. On page 12, item 15, however, applicants discharging to waters listed on IDEQ's most recent CWA § 303(d) list for temperature must submit one complete season (May 1 through November 1) of continuous temperature monitoring data with a copy of their NOI. Facilities that discharge to § 303(d) listed waters for temperature will likely not be able to submit an NOI with one complete season of continuous temperature monitoring data within 90 days after the effective date of the permit. It would make more sense for facilities to begin this sampling once the permit becomes effective. EPA should clarify that such facilities can submit this sampling information after the sampling period has concluded or when the permit is renewed. If this requirement is not adjusted, several facilities in Idaho that would otherwise qualify for coverage under the Proposed Permit would not be eligible. In addition, there is a lack of detail in the Proposed Permit and the Section 401 Water Quality Certification regarding where the monitoring should occur and the sampling intervals. EPA should provide more information on these requirements.

- Effluent Limits Apply Only to Pollutants Added by the Facility: Sections III.A.1-6 of the Proposed Permit would prohibit the "discharge" of various materials that would impair beneficial uses or cause other adverse effects in the receiving water. Proposed Permit at 14. In addition, sections III.A.8-12, Tables 1-5, set forth numeric limits that would apply to the facility's "effluent." *Id.* at 14-17. Consistent with EPA's longstanding position, the Proposed Permit should be revised to clarify that these prohibitions apply only to pollutants that are *added* to receiving waters by the facility, and not to pollutants that are *passed through* the facility from upstream waters, including pollutants contained in facility reservoirs.

- Sampling Frequency: The Proposed Permit delineates four types of discharges that must be sampled, some on a monthly basis. Proposed Permit at 15-17. Monthly sampling is not needed, and there are limited benefits, if any, associated with the extensive sampling scheme proposed. Indeed, the 2009 Region 1 general permit for hydroelectric facilities requires less frequent sampling for similar discharges. For example, whereas the Proposed Permit requires sampling for flow, pH, and oil and grease for cooling water once per month, the Region 1 permit requires sampling once per quarter.[48]

  EPA Region 1 initially proposed monthly sampling, but UWAG and NHA noted in their 2004 joint comments[49] on the Region 1 proposal that monthly sampling is not needed and that there are limited benefits, if any, associated with the extensive sampling scheme Region 1 proposed. UWAG and NHA explained that many of the activities proposed to be regulated under the general permit are periodic in nature and may occur only once or twice a year and, therefore, monthly monitoring would be wasteful. *Id.* at 9. We also noted that obtaining monthly samples could present a substantial logistical challenge to owners and operators due to extreme weather conditions, sample holding time, and lab accessibility. Data that NHA and UWAG member organizations acquired during the FERC licensing process show that the sample results would be well below the discharge limitations that were proposed by Region 1. Region 1 recognized these concerns and, in the final 2009 Region 1 permit, EPA reduced the sampling frequency. In its Response to Comments on the Region 1 permit, EPA stated that it "determined a less frequent monitoring frequency will still provide adequate pollutant monitoring data...."[50]

  Region 10 has provided no principled basis for requiring sampling more frequently than Region 1 determined was sufficient in the 2009 Region 1 general permit. We recommend that Region 10 reduce the sampling frequencies to, at the very least, align with the sampling frequencies that Region 1 determined to be reasonable in the 2009 Region 1 general permit.

---

[48] *See* EPA Region 1 General Permits Under the NPDES for Hydroelectric Generating Facilities, Permit Nos. MAG360000 and NHG360000, at 3-4, 6 (Nov. 10, 2009) ("Region 1 Permit").

[49] Joint Comments of NHA and UWAG on the Draft NPDES General Permits MAG360000 and NHG360000 for Hydroelectric Generating Facilities, at 9-10 (Jan. 16, 2004).

[50] EPA Region 1 General Permit Response to Comments NPDES General Permit Nos. MAG360000 and NHG360000, at 42. ("Region 1 Response to Comments").

Sierra Club v. EPA 18cv3472 NDCA Tier 1 ED_002061_00098710-00043

- Flood/High Water Discharges: The Proposed Permit would impose effluent limitations and monitoring for maintenance-related water during flood/high water events and for equipment-related backwash strainer water. Proposed Permit at 16. In the Region 1 permit, however, EPA recognized that "sampling discharges from emergency flood devices can be dangerous and impracticable," and determined that the monitoring and reporting requirements it had proposed for the flood water discharges were "inappropriate." *See* Region 1 Response to Comments at 19. As a result, the Region 1 permit required only limited monitoring and reporting for facility maintenance-related water during flood/high water events and did not require monitoring for equipment-related backwash strainer water. Region 1 Permit at 6. Region 10 should make similar adjustments to the Proposed Permit.

- Monitoring Adjustment Opportunity: The Region 1 Permit allows for the permittee to request a reduction in the monitoring frequency of any pollutant after 10 valid pollutant samples for the outfall indicate compliance with the pertinent permit limits or demonstrate no reasonable potential to cause or contribute to water quality standards violation. Region 1 Permit at 23. We recommend that EPA revise the Proposed Permit to include the same adjustment opportunity.

- BMP Incident: Under section IV.B.6, facilities must prepare a written report to EPA and IDEQ within seven days after a "BMP incident" has been addressed. However, this term is not defined in the permit. Proposed Permit at 22. EPA should define "BMP incident."

- Toxic Substances v. Toxic Pollutants: Pursuant to section III.A.2, the permittee must not discharge "toxic substances" in concentrations that impair the designated beneficial uses of the receiving water. Proposed Permit at 14. Also, section V.I addresses "Changes in Discharge of Toxic Substances." *Id.* at 29. EPA should clarify whether "toxic substances" are equivalent to "toxic pollutants" as defined in 40 C.F.R. § 122.2.

- "Deleterious Materials": Similarly, section III.A.3, Proposed Permit at 14, and section V.G.5, *id.* at 29, refer to "deleterious materials," but these materials are not defined. These terms should also be defined.

- Total Suspended Solids (TSS) Levels: The Proposed Permit requires a monitoring method that will achieve a maximum Minimum Level for TSS of 5 mg/L. But there is no monitoring requirement for TSS, and EPA acknowledges that TSS is naturally occurring. Proposed Permit at 17, 45. EPA must explain the basis for such a requirement. In the Region 1 general permit for hydroelectric facilities, for example, this issue was resolved by removing the requirement to monitor TSS.

- "Maximum Minimum Level": The table in Appendix A lists the "maximum Minimum Level (ML)" for pollutants in the permit. Proposed Permit at 45. EPA must clarify how facilities should apply this standard.

- "Significant": Appendix C uses the term "significant" in multiple places to describe what must be included in the BMP Plan, but the term "significant" is not defined in the

Proposed Permit. EPA should clarify the factors that will be used to determine when a spill, event, or some other occurrence is "significant."

VIII. Conclusion

In sum, EPA Region 10 should not apply CWA § 316(b) to hydropower facilities. Section 316(b) was intended by Congress to address CWIS at steam electric and similar facilities, not hydropower projects. Furthermore, EPA CWIS regulations do not call for application of § 316(b) to hydropower facilities, and those regulations were not developed with any consideration of doing so, making it highly inappropriate for Region 10 to seek to impose the regulations or elements of them on the facilities. As noted above, the FPA and CWA § 401 fully protect both water quality and fish and wildlife in the context of hydropower facilities. Therefore, Region 10 should remove any § 316(b)-related provisions from the Proposed Permit.

UWAG and NHA appreciate the opportunity to comment on the Proposed Permit and provide factual information regarding operation of our members' hydroelectric facilities. No commenter, however, can make up for the lack of a comprehensive administrative record in the first instance that provides the Agency's evaluation of the availability and feasibility of potential technologies for hydroelectric facilities. We hope that EPA will pursue our recommendations and we look forward to working with you to address these meaningful issues.

Message

From: Itzkoff, Donald M (GE Corporate) [Donald.itzkoff@ge.com]
Sent: 9/28/2017 3:33:31 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
Subject: Update

Friends,

Friday, September 29 will be my last day at GE. I have accepted a new external opportunity in the transportation sector focused on rail and public transportation, based in Washington, DC.

Darby Becker, Executive Counsel, GE Government Affairs & Policy, will assume responsibility for government affairs matters related to GE Transportation. Darby has deep transportation expertise and can be reached at Darby.Becker@ge.com or Ex. 6

My new role begins in January, 2018 and I'll have more to share soon. In the meantime I can be reached at Ex. 6

It has been a great privilege to be associated with General Electric Company for the past nearly seven years and to work with – and learn from – all of you. I look forward to keeping in touch.

Best,

Don

Donald M. Itzkoff
Government Affairs & Policy
GE Transportation

Ex. 6
Donald.Itzkoff@ge.com

1299 Pennsylvania Ave, NW Suite 900
Washington, DC USA 20004
General Electric Company

GE imagination at work

Message

From: Freedman, Jon B (GE Power) [jon.freedman@ge.com]
Sent: 9/18/2017 2:11:45 PM
To: Forsgren, Lee [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=a055d7329d5b470fbaa9920ce1b68a7d-Forsgren, D]
CC: Steve Dye [sdye@wef.org]
Subject: FW: You're Invited!
Attachments: Jon Freedman.vcf

Hello Lee,

It was good meeting with you and Mike Shapiro back on June 27th.

I understand from Steve Dye that you and some others from EPA will be attending WEFTEC this year.

I'd like to share the invitation to our reception on Monday, October 2, from 6 to 10 PM. Please feel free to share it with others at EPA.

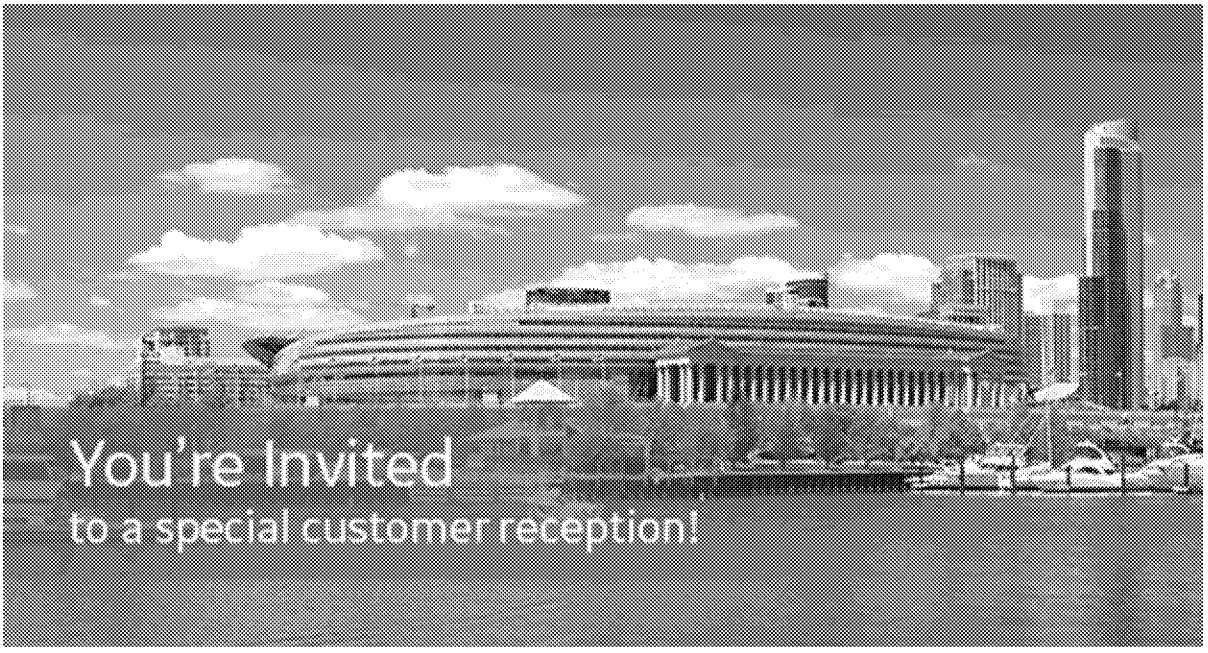
All best,

Jon

Jon Freedman
Vice President - Global Partnerships & P...
GE Water & Process Technologies
Work
Ex. 6
jon.freedman@ge.com
jon.freedman@ge.com
1299 Pennsylvania Ave., NW, Suite 900
Washington, DC 20004

From: Nelson, Karla J (GE Power)
Sent: Thursday, August 17, 2017 6:20 PM
To: Nelson, Karla J (GE Power) <Karla.Nelson@ge.com>
Subject: You're Invited!

All—
An easier format to forward. Some were concerned you would accidentally forward the list of customers invited. Delete this red text before forwarding. Thanks, Karla
.



In March 2017, SUEZ announced that, together with Caisse de dépôt et placement du Québec, they would purchase GE's Water & Process Technologies. Find out more at the annual WEFTEC Customer Appreciation Reception.

You are invited to mingle with peers and colleagues at the reception.

- **Date:** Monday, October 2, 2017
- **Time:** 6:00 p.m. – 10:00 p.m.
- **Venue:** SOLDIER FIELD
  1410 S. Museum Campus Drive
  Chicago, IL 60605

Reception to include appetizers and cocktails.

Please let us know if you can attend by clicking the link below.

Please RSVP by **September 22, 2017**.

RSVP NOW!

Contact

Full Name: Jon Freedman
Last Name: Freedman
First Name: Jon
Company: Vice President - Global Partnerships & Policy

Business Address: 1299 Pennsylvania Ave., NW, Suite 900 Washington, DC 20004

Mobile Phone: Ex. 6

Web Page: http://www.gewater.com

E-mail: jon.freedman@ge.com

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 9/3/2017 12:09:38 PM
To: Nolan, Robert M [robert.m.nolan@exxonmobil.com]
Subject: Re: Sheen

We are getting widespread reports of sheens and much worse from the flooded areas.

Sent from my iPhone

On Sep 3, 2017, at 7:27 AM, Nolan, Robert M <robert.m.nolan@exxonmobil.com> wrote:

> Lee just curious, are you getting similar reports from facilities that were flooded?
>
> Robert Nolan
> **Ex. 6**
>
> On Sep 3, 2017, at 7:24 AM, Forsgren, Lee <Forsgren.Lee@epa.gov> wrote:
>
> > Thanks Robert. Glad to know it was not associated with a spill.
> >
> > Sent from my iPhone
> >
> > On Sep 3, 2017, at 6:45 AM, Nolan, Robert M <robert.m.nolan@exxonmobil.com> wrote:
> >
> > > Lee we reported a second sheen observed on receding flood waters at the Beaumont Refinery. Again, this was not associated with a spill.
> > >
> > > Thanks
> > >
> > > Robert Nolan
> > > **Ex. 6**

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 9/2/2017 10:03:33 PM
To: Nolan, Robert M [robert.m.nolan@exxonmobil.com]
Subject: Re: TX/LA Flooding

Thanks.

Sent from my iPhone

On Sep 2, 2017, at 6:02 PM, Nolan, Robert M <robert.m.nolan@exxonmobil.com> wrote:

> Formally announced just a few minutes ago
>
> **David Ross of Wisconsin to be an Assistant Administrator of the Environmental Protection Agency, Office of Water.** Mr. Ross currently serves as the Director of the Environmental Protection Unit for the Wisconsin Department of Justice. He previously served as a senior assistant attorney general in the Wyoming Attorney General's Office, where he represented the Wyoming Department of Environmental Quality on water quality matters. Mr. Ross also represented the State of Wyoming on the Assumable Waters Subcommittee of the National Advisory Council for Environmental Policy and Technology. Prior to entering public service, Mr. Ross practiced environmental law in Washington DC and worked as an environmental consultant in California. Mr. Ross attended the University of Wisconsin-Madison for undergraduate studies, and grew up in Appleton, Wisconsin. He earned his law degree and a Master of Studies in Environmental Law from Vermont Law School. While in law school, Mr. Ross served as Editor-in-Chief of the Vermont Law Review.
>
> Robert Nolan
>
> **Ex. 6**
>
> On Sep 2, 2017, at 4:56 PM, Forsgren, Lee <Forsgren.Lee@epa.gov> wrote:
>
> > Thanks Robert.
> >
> > Sent from my iPhone
> >
> > On Sep 2, 2017, at 4:45 PM, Nolan, Robert M <robert.m.nolan@exxonmobil.com> wrote:
> >
> > > Lee, just learned of this a few minutes ago. A sheen (not a spill) on a roadway adjacent to our Beaumont Refinery. Sounds like it's from

runoff. We've reported to the NRC and deployed our internal emergency response team to address.

Will provide additional info as it becomes available.

http://www.beaumontenterprise.com/news/article/Exxon-reports-oil-spill-on-county-property-12169312.php

Exxon Mobil Beaumont refinery reports oil spill

Oil from the Exxon Mobil Beaumont refinery has spilled outside the facility onto a nearby county road, spokeswoman Ashley Alemayehu said.
"We reported to the government not too long ago that we are monitoring a sheen on Gulf States Road," she said. That road, owned by the county, runs between Exxon Mobil and Arkema facilities towards the Neches River.
The lower part of the refinery is flooding, she said. "The levee for the refinery is at 10 feet," and water has gone over it.
The refinery is working to contain the spill and has "deployed emergency response teams to provide additional environmental protection." The company has notified authorities.
Exxon Mobil's chemical plant is still dry, she said, and parts of the refinery at higher elevation are secure.

Robert Nolan

Ex. 6

On Sep 1, 2017, at 6:25 PM, Forsgren, Lee <Forsgren.Lee@epa.gov> wrote:

> Robert,
>
> It was great to talk to you this afternoon. Let's stay in touch over the next few days. Hopefully the calls will be short with little to talk about except that things are getting better in Texas.
>
> If you need to contact me, call me on my EPA cell at
> **Ex. 6**
>
> Have a great weekend.

Lee

D. Lee Forsgren
Deputy Assistant Administrator
Office Of Water
Environmental Protection Agency
1200 Pennsylvania Avenue, VW
Room 3219 WJCE
Washington, DC 20460
Phone: 202-564-5700
Forsgren.Lee@epa.gov

From: Nolan, Robert M
[mailto:robert.m.nolan@exxonmobil.com]
Sent: Friday, September 1, 2017 2:04 PM
To: Forsgren, Lee <Forsgren.Lee@epa.gov>
Subject: Re: TX/LA Flooding

Lee, happy to talk at 4:30. Pls call my home phone at **Ex. 6** I have less than adequate cell phone reception.

Also our Emergency Support Group for the response meets at 3 ET today. If you have specific questions it would be good to feed them into the Group at that time.

Thanks

Robert Nolan

Ex. 6

On Sep 1, 2017, at 1:16 PM, Forsgren, Lee <Forsgren.Lee@epa.gov> wrote:

> Thanks Michael.
>
> Andrew and Robert. It is very nice to meet you. Perhaps we could chat later this afternoon, after 4:30 pm EDT would work best for me. My direct number is 202-564-0311.
>
> Thanks,
> Lee
>
> **D. Lee Forsgren**
> Deputy Assistant Administrator

Office Of Water
Environmental Protection Agency
1200 Pennsylvania Avenue, VW
Room 3219 WJCE
Washington, DC 20460
Phone: 202-564-5700
Forsgren.Lee@epa.gov

From: Michael Whatley [mailto:MWhatley@hbwresources.com]
Sent: Friday, September 1, 2017 12:23 PM
To: andrew.c.knapp@exxonmobil.com; Forsgren, Lee <Forsgren.Lee@epa.gov>; Nolan, Robert M <robert.m.nolan@exxonmobil.com>
Subject: TX/LA Flooding

Andy, Robert and Lee –

Want to introduce you (at least electronically) and open up a line of communications between ExxonMobil and Lee regarding the flooding in Texas and Louisiana.

Lee is serving as the Acting Assistant Administrator for Water at EPA.

Please let me know if I can do anything to further aid your conversations.

Michael

<image002.jpg>

Michael Whatley
HBW Resources
1666 K Street, NW, Suite 500
Washington, DC 20006
Ex. 6

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 9/1/2017 11:17:05 PM
To: Jeff Gunnulfsen [JGunnulfsen@afpm.org]
Subject: Re: Follow up on call regarding Hurricane Harvey and Gulf Coast Refiners

Thanks

Sent from my iPhone

On Sep 1, 2017, at 6:52 PM, Jeff Gunnulfsen <JGunnulfsen@afpm.org> wrote:

> I think it may be good news. I'll send another check tomorrow and see if we hear anything.
>
> Sent from my iPhone
>
> On Sep 1, 2017, at 6:39 PM, Forsgren, Lee <Forsgren.Lee@epa.gov> wrote:
>
> > Gentlemen,
> >
> > I certainly hope that "No News is Good News" on the refining front in the Gulf. If you have anything you think I should know please email me or give me a call at **Ex. 6** **Ex. 6**
> >
> > Have a good weekend.
> >
> > Lee
> >
> > **D. Lee Forsgren**
> > Deputy Assistant Administrator
> > Office Of Water
> > Environmental Protection Agency
> > 1200 Pennsylvania Avenue, VW
> > Room 3219 WJCE
> > Washington, DC 20460
> > Phone: 202-564-5700
> > Forsgren.Lee@epa.gov
>
> **From:** Jeff Gunnulfsen [mailto:JGunnulfsen@afpm.org]
> **Sent:** Monday, August 28, 2017 9:32 PM
> **To:** Forsgren, Lee <Forsgren.Lee@epa.gov>
> **Cc:** David Friedman <DFriedman@afpm.org>
> **Subject:** Re: Follow up on call regarding Hurricane Harvey and Gulf Coast Refiners
>
> Lee---
> Formosa Plastics Corporation, Texas (FPC TX) in Point Comfort, TX is not having any water issues, at this time, which would warrant an EPA spill response team. If the

situation changes, we will let you know.

Sent from my iPhone

On Aug 28, 2017, at 6:54 PM, Forsgren, Lee <Forsgren.Lee@epa.gov> wrote:

> Great. Thanks
>
> Sent from my iPhone
>
> On Aug 28, 2017, at 6:52 PM, Jeff Gunnulfsen <JGunnulfsen@afpm.org> wrote:
>
> > Sorry not having problems!
> >
> > Sent from my iPhone
> >
> > On Aug 28, 2017, at 6:46 PM, Forsgren, Lee <Forsgren.Lee@epa.gov> wrote:
> >
> > > They are or are not having problems?
> > >
> > > Sent from my iPhone
> > >
> > > On Aug 28, 2017, at 6:43 PM, Jeff Gunnulfsen <JGunnulfsen@afpm.org> wrote:
> > >
> > > > Thanks Lee!
> > > > I just heard from Delek and their refineries having any problems right now
> > > >
> > > > Sent from my iPhone
> > > >
> > > > On Aug 28, 2017, at 6:28 PM, Forsgren, Lee <Forsgren.Lee@epa.gov> wrote:
> > > >
> > > > > Dave, Rich, and Jeff,
> > > > >
> > > > > Here is what my folks are telling me about the

status on the waiver requests.

For the first question on off road diesel, we are expecting to get a waiver request from Texas and the fuels waiver team in OECA and OAR will analyze that request.

For the second question, butane is a component of gasoline. The waivers we have granted in Texas and Louisiana will have

the effect of allowing refiners to add more butane to gasoline.

Regards,
Lee

From: Forsgren, Lee
Sent: Monday, August 28, 2017 6:13 PM
To: 'Jeff Gunnulfsen' <JGunnulfsen@afpm.org>; Michael Whatley <MWhatley@hbwresources.com>
Cc: Richard Moskowitz <rmoskowitz@afpm.or

g>;
David
Friedm
an
<DFried
man@a
fpm.org
>
Subject
: Follow
up on
call
regardi
ng
Hurrica
ne
Harvey
and
Gulf
Coast
Refiner
s

Dave
and
Jeff,

Thanks
for the
call. I
look
forward
to any
informa
tion
you
might
be able
to
provide
. On
the
waiver
request
s you
asked
me
about,
it is my
underst
anding
that
those

issues are being worked, but probably can't be finished tonight but I will follow up on the status in the morning.

Hope we can stay in touch going forward.

Lee

D. Lee Forsgren
Deputy Assistant Administrator
Office Of Water
Environmental Protection Agency
1200 Pennsylvania Avenue, VW

Room
3219
WJCE
Washin
gton,
DC
20460
Phone:
202-
564-
5700
Forsgre
n.Lee@
epa.gov

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 8/30/2017 1:45:38 PM
To: Jeff Gunnulfsen [JGunnulfsen@afpm.org]
Subject: RE: Hurricane Harvey and Gulf Coast Refinery Flooding?

That is great news!!!!

From: Jeff Gunnulfsen [mailto:JGunnulfsen@afpm.org]
Sent: Wednesday, August 30, 2017 9:42 AM
To: Forsgren, Lee <Forsgren.Lee@epa.gov>
Subject: FW: Hurricane Harvey and Gulf Coast Refinery Flooding?

Lee—
From FHR-----

Subject: RE: Hurricane Harvey and Gulf Coast Refinery Flooding?

We are wet but maintaining!

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 8/29/2017 2:17:38 PM
To: Jeff Gunnulfsen [JGunnulfsen@afpm.org]
CC: David Friedman [DFriedman@afpm.org]
Subject: Re: Flooding Info-

Thanks

Sent from my iPhone

On Aug 29, 2017, at 9:45 AM, Jeff Gunnulfsen <JGunnulfsen@afpm.org> wrote:

> Lee—
> From CP-Chem---
> Although all of our facilities have taken on some quantities of water at this time there does not appear to be any risk of any releases for any of our facilities.
>
> Director
> Security & Risk Management Issues
> AFPM
> Suite 700
> 1667 K St., NW
> Washington, DC 20006
> **Ex. 6**
> Email: jgunnulfsen@afpm.org

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 8/29/2017 2:32:26 AM
To: Jeff Gunnulfsen [JGunnulfsen@afpm.org]
Subject: Re: Chevron sites

Thanks !

Sent from my iPhone

On Aug 28, 2017, at 9:42 PM, Jeff Gunnulfsen <JGunnulfsen@afpm.org> wrote:

> Lee---
> From Chevron--
> At this time, Chevron's preliminary inquiries indicate no loss of containment from our onshore or offshore assets. Assessment will continue after flood waters have receded and deemed safe for further evaluation. To assist in the immediate relief efforts, Chevron has made a $1 million donation to the American Red Cross. We will continue to work diligently to support our Houston-area employees and the community, of which we are a proud member. For further details and the latest updates, please visithttps://www.chevron.com/media/updates.
>
> Sent from my iPhone

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 8/29/2017 2:31:44 AM
To: Jeff Gunnulfsen [JGunnulfsen@afpm.org]
Subject: Re: Follow up on call regarding Hurricane Harvey and Gulf Coast Refiners

Thanks

Sent from my iPhone

On Aug 28, 2017, at 9:32 PM, Jeff Gunnulfsen <JGunnulfsen@afpm.org> wrote:

> Lee---
> Formosa Plastics Corporation, Texas (FPC TX) in Point Comfort, TX is not having any water issues, at this time, which would warrant an EPA spill response team. If the situation changes, we will let you know.
>
> Sent from my iPhone
>
> On Aug 28, 2017, at 6:54 PM, Forsgren, Lee <Forsgren.Lee@epa.gov> wrote:
>
> > Great. Thanks
> >
> > Sent from my iPhone
> >
> > On Aug 28, 2017, at 6:52 PM, Jeff Gunnulfsen <JGunnulfsen@afpm.org> wrote:
> >
> > > Sorry not having problems!
> > >
> > > Sent from my iPhone
> > >
> > > On Aug 28, 2017, at 6:46 PM, Forsgren, Lee <Forsgren.Lee@epa.gov> wrote:
> > >
> > > > They are or are not having problems?
> > > >
> > > > Sent from my iPhone
> > > >
> > > > On Aug 28, 2017, at 6:43 PM, Jeff Gunnulfsen <JGunnulfsen@afpm.org> wrote:
> > > >
> > > > > Thanks Lee!
> > > > > I just heard from Delek and their refineries having any problems right now
> > > > >
> > > > > Sent from my iPhone
> > > > >
> > > > > On Aug 28, 2017, at 6:28 PM, Forsgren, Lee <Forsgren.Lee@epa.gov> wrote:
> > > > >
> > > > > > Dave, Rich, and Jeff,

Here is what my folks are telling me about the status on the waiver requests.

For the first question on off road diesel, we are expecting to get a waiver request from Texas and the fuels waiver team in OECA and OAR will analyze that request.

For the second question, butane is a component of gasoline. The waivers we have granted in Texas and Louisiana will have the effect of allowing refiners to add more butane to gasoline.

Regards,
Lee

From: Forsgren, Lee
Sent: Monday, August 28, 2017 6:13 PM
To: 'Jeff Gunnulfsen' <JGunnulfsen@afpm.org>; Michael Whatley <MWhatley@hbwresources.com>
Cc: Richard Moskowitz <rmoskowitz@afpm.org>; David Friedman <DFriedman@afpm.org>
Subject: Follow up on call regarding Hurricane Harvey and Gulf Coast Refiners

Dave and Jeff,

Thanks for the call. I look forward to any

information you might be able to provide. On the waiver requests you asked me about, it is my understanding that those issues are being worked, but probably can't be finished tonight but I will follow up on the status in the morning.

Hope we can stay in touch going forward.

Lee

D. Lee Forsgren
Deputy Assistant Administrator
Office Of Water
Environmental Protection Agency
1200 Pennsylvania Avenue, VW
Room 3219 WJCE
Washington, DC 20460
Phone: 202-564-5700
Forsgren.Lee@epa.gov

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 8/28/2017 10:34:14 PM
To: Jeff Gunnulfsen [JGunnulfsen@afpm.org]
Subject: Re: Follow up on call regarding Hurricane Harvey and Gulf Coast Refiners

Look forward to that opportunity.

Sent from my iPhone

On Aug 28, 2017, at 6:32 PM, Jeff Gunnulfsen <JGunnulfsen@afpm.org> wrote:

> Thanks Lee hopefully we get some info that will be helpful and thanks for looking into the waiver issue. Once the storm issues calm down we should have a meeting to go over some of the water issues AFPM is concerned about.
>
> Sent from my iPhone
>
> On Aug 28, 2017, at 6:13 PM, Forsgren, Lee <Forsgren.Lee@epa.gov> wrote:
>
> > Dave and Jeff,
> >
> > Thanks for the call. I look forward to any information you might be able to provide. On the waiver requests you asked me about, it is my understanding that those issues are being worked, but probably can't be finished tonight but I will follow up on the status in the morning.
> >
> > Hope we can stay in touch going forward.
> >
> > Lee
> >
> > **D. Lee Forsgren**
> > Deputy Assistant Administrator
> > Office Of Water
> > Environmental Protection Agency
> > 1200 Pennsylvania Avenue, VW
> > Room 3219 WJCE
> > Washington, DC 20460
> > Phone: 202-564-5700
> > Forsgren.Lee@epa.gov

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 9/5/2017 5:23:42 PM
To: Nolan, Robert M [robert.m.nolan@exxonmobil.com]
Subject: RE: FYI.

No we in the Federal Family are just learning to catch up to speed of the and since we are monitoring refineries and chemical plants very closely we are actually almost on top of things.

-----Original Message-----
From: Nolan, Robert M [mailto:robert.m.nolan@exxonmobil.com]
Sent: Tuesday, September 5, 2017 1:11 PM
To: Forsgren, Lee <Forsgren.Lee@epa.gov>
Subject: Re: FYI.

Wow. I thought I had my lag time down to almost real time! Irma has the potential to really complicate things more broadly on fuel supply.

Robert Nolan
Ex. 6

> On Sep 5, 2017, at 1:07 PM, Forsgren, Lee <Forsgren.Lee@epa.gov> wrote:
>
> Thanks Robert. I saw that through the Coast Guard's desk. Still nothing serious. Thank God. Glad to hear the Colonial pipeline is getting back up and running. So product can start to be transported North.
>
> Lee
>
> D. Lee Forsgren
> Deputy Assistant Administrator
> Office Of Water
> Environmental Protection Agency
> 1200 Pennsylvania Avenue, VW
> Room 3219 WJCE
> Washington, DC 20460
> Phone: 202-564-5700
> Forsgren.Lee@epa.gov
>
>
>
>
> -----Original Message-----
> From: Nolan, Robert M [mailto:robert.m.nolan@exxonmobil.com]
> Sent: Tuesday, September 5, 2017 1:02 PM
> To: Forsgren, Lee <Forsgren.Lee@epa.gov>
> Subject: FYI.
>
> Lee, a third sheen has been reported to the NRC. A very light sheen observed on Wharf 2 which is being contained with boom.
>
> Robert Nolan
>
> Ex. 6
>

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 8/12/2017 6:31:24 PM
To: Gale, Kat [Kat_Gale@afandpa.org]
CC: Noe, Paul [Paul_Noe@afandpa.org]; Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]
Subject: Re: AF&PA Meeting Request for September 6 or 7, 2017

Kat,
Would be happy to meet with Paul and the AF&PA folks if possible on those dates. Crystal Penman will be in contact with you to see if something can be worked out.

Lee

Sent from my iPhone

On Aug 11, 2017, at 9:02 AM, Gale, Kat <Kat_Gale@afandpa.org> wrote:

> Dear Mr. Forsgren,
>
> Attached please find a request from Paul Noe, Vice President of Public Policy at the American Forest & Paper Association (AF&PA), for you to meet with AF&PA's Environment Resource Committee on the afternoon of September 6 or the morning of September 7, 2017.
>
> If you or your assistant would kindly reply to me with your availability, we would greatly appreciate it.
>
> Thank you in advance for your thoughtful consideration of AF&PA's meeting request.
>
> Kind regards,
>
> Kat Gale
>
> **Kat Gale**
> Senior Coordinator, Legal and Public Policy
> Kat_Gale@afandpa.org
> **Ex. 6**
> AMERICAN FOREST & PAPER ASSOCIATION
> 1101 K Street, N.W., Suite 700
> Washington, D.C. 20005
> <image001.jpg> <image002.jpg> <image003.jpg><image004.jpg><image005.jpg><image006.jpg>
>
> <AFPA Meeting Request EPA - Forsgren 080717.pdf>

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 6/23/2017 8:27:37 PM
To: Itzkoff, Donald M (GE Corporate) [Donald.itzkoff@ge.com]
Subject: RE: Contact information

Thanks. Just fixed it.

From: Itzkoff, Donald M (GE Corporate) [mailto:Donald.itzkoff@ge.com]
Sent: Friday, June 23, 2017 4:22 PM
To: Forsgren, Lee <Forsgren.Lee@epa.gov>
Subject: RE: Contact information

You're like a block away.

Also just noticed this – there's a typo in your signature block – Pennsylvania, NW . . .

At least you know I was reading your email. To the bottom.

From: Forsgren, Lee [mailto:Forsgren.Lee@epa.gov]
Sent: Friday, June 23, 2017 4:20 PM
To: Itzkoff, Donald M (GE Corporate) <Donald.itzkoff@ge.com>
Subject: EXT: RE: Contact information

Will do!

From: Itzkoff, Donald M (GE Corporate) [mailto:Donald.itzkoff@ge.com]
Sent: Friday, June 23, 2017 4:18 PM
To: Forsgren, Lee <Forsgren.Lee@epa.gov>
Subject: RE: Contact information

Awesome! Glad you are over there. Let me know what you are doing and how it goes!!

Don

From: Forsgren, Lee [mailto:Forsgren.Lee@epa.gov]
Sent: Friday, June 23, 2017 4:12 PM
To: Itzkoff, Donald M (GE Corporate) <Donald.itzkoff@ge.com>
Subject: EXT: Contact information

Don,

I am now a seasoned EPA veteran of a week (well more like 4.5 days).

My new contact information is as follows:

Phone direct: 202-564-0311
EPA Cell phone number: **Ex. 6**
Main Office of Water Number: 202-564-5700

Email: Forsgren.lee@epa.gov

If it is a non-work matter please contact me at:
Cell Phone: Ex. 6
Personal Email: Ex. 6

Look forward to continuing to work with you.

Regards,
Lee

D. Lee Forsgren
Deputy Assistant Administrator
Office Of Water
Environmental Protection Agency
1200 Pennsylvaina Avenue, VW
Room 3219 WJCE
Washington, DC 20460
Phone: 202-564-5700
Forsgren.Lee@epa.gov

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 6/23/2017 8:20:05 PM
To: Itzkoff, Donald M (GE Corporate) [Donald.itzkoff@ge.com]
Subject: RE: Contact information

Will do!

From: Itzkoff, Donald M (GE Corporate) [mailto:Donald.itzkoff@ge.com]
Sent: Friday, June 23, 2017 4:18 PM
To: Forsgren, Lee <Forsgren.Lee@epa.gov>
Subject: RE: Contact information

Awesome! Glad you are over there. Let me know what you are doing and how it goes!!

Don

From: Forsgren, Lee [mailto:Forsgren.Lee@epa.gov]
Sent: Friday, June 23, 2017 4:12 PM
To: Itzkoff, Donald M (GE Corporate) <Donald.itzkoff@ge.com>
Subject: EXT: Contact information

Don,

I am now a seasoned EPA veteran of a week (well more like 4.5 days).

My new contact information is as follows:

Phone direct: 202-564-0311
EPA Cell phone number: Ex. 6
Main Office of Water Number: 202-564-5700

Email: Forsgren.lee@epa.gov

If it is a non-work matter please contact me at:
Cell Phone: Ex. 6
Personal Email: Ex. 6

Look forward to continuing to work with you.

Regards,
Lee

D. Lee Forsgren
Deputy Assistant Administrator
Office Of Water
Environmental Protection Agency
1200 Pennsylvaina Avenue, VW
Room 3219 WJCE

Washington, DC 20460
Phone: 202-564-5700
Forsgren.Lee@epa.gov

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 6/23/2017 8:12:27 PM
To: donald.itzkoff@ge.com
Subject: Contact information

Don,

I am now a seasoned EPA veteran of a week (well more like 4.5 days).

My new contact information is as follows:

Phone direct: 202-564-0311
EPA Cell phone number: Ex. 6
Main Office of Water Number: 202-564-5700

Email: Forsgren.lee@epa.gov

If it is a non-work matter please contact me at:
Cell Phone: Ex. 6
Personal Email: Ex. 6

Look forward to continuing to work with you.

Regards,
Lee

D. Lee Forsgren
Deputy Assistant Administrator
Office Of Water
Environmental Protection Agency
1200 Pennsylvaina Avenue, VW
Room 3219 WJCE
Washington, DC 20460
Phone: 202-564-5700
Forsgren.Lee@epa.gov

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 6/13/2018 3:32:44 PM
To: Wheeler, Andrew R. [Andrew.Wheeler@FaegreBD.com]
CC: Greaves, Holly [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=abcb6428b3df40a9a78b059a8ba59707-Greaves, Ho]; Hanson, Paige (Catherine) [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=95adc1b2ac3b40ab9dc591801d594df8-Hanson, Cat]; Sawyers, Andrew [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=49214552a00b4ab7b168ec0edba1d1ac-Sawyers, Andrew]; Lopez, Peter [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b7b64b3b2f984708840a5f342309d460-Lopez, Pete]; Ross, David P [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=119cd8b52dd14305a84863124ad6d8a6-Ross, David]
Subject: One Pager on Puerto Rico
Attachments: Reference Paper on Funding 6_13_18.docx; ATT00001.htm

Andrew,

Per your request here is a one pager that you requested on the status of the Puerto Rico SRF negotiations.

My apologies for not having this for you yesterday. Deliberative Process / Ex. 5 Deliberative Process / Ex. 5 If you have any additional questions please just let me know.

Respectfully,
Lee

D. Lee Forsgren

Deputy Assistant Administrator
Office Of Water
Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Room 3219 WJCE
Washington, DC 20460
Phone: 202-564-5700
Forsgren.Lee@epa.gov

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 5/4/2018 8:45:38 PM
To: Baer, Louis [LBaer@cement.org]
CC: Franklin, Charles [CFranklin@cement.org]; Derby, Rachel [RDerby@cement.org]; Mayer, Lauren [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=7e806d6189b44868a53ff4bdce1af43e-Mayer, Laur]; Campbell, Ann [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b8c25a0c2fb648b6a947694a8492311e-Campbell, Ann]
Subject: RE: Thank You - PCA and NACA

Louis,

You are very welcome. I really enjoyed speaking with the group.

Lee

D. Lee Forsgren
Deputy Assistant Administrator
Office Of Water
Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Room 3219 WJCE
Washington, DC 20460
Phone: 202-564-5700
Forsgren.Lee@epa.gov

From: Baer, Louis [mailto:LBaer@cement.org]
Sent: Friday, May 4, 2018 4:33 PM
To: Forsgren, Lee <Forsgren.Lee@epa.gov>
Cc: Franklin, Charles <CFranklin@cement.org>; Derby, Rachel <RDerby@cement.org>; Mayer, Lauren <mayer.lauren@epa.gov>
Subject: Thank You - PCA and NACA

Lee,

The Portland Cement Association and North American Concrete Alliance would like to thank you for taking the time to speak on our Waters of the United States (WOTUS) Panel on April 25. Attached is our formal thank you letter. Thank you very much for contributing to a successful and memorable event for our members. Have a great weekend.

Best,
Louis Baer

Louis A. Baer, Esq., CPEA
Director/Assistant Counsel, Government Affairs
Portland Cement Association

1150 Connecticut Avenue NW, Suite 500
Ex. 6
lbaer@cement.org
www.cement.org

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 3/23/2018 6:31:03 PM
To: Duncan, Deidre [dduncan@hunton.com]
CC: Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]; Campbell, Ann [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b8c25a0c2fb648b6a947694a8492311e-Campbell, Ann]; Drinkard, Andrea [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=808a6b7b65bf447f93dad2f510feaf61-ADRINKAR]
Subject: Re: Invitation to Speak at the Energy Bar Association's Annual Conference 5/7

Deidra
Let me look at the calendar and see what might be possible.

Lee,

Sent from my iPhone

On Mar 23, 2018, at 1:33 PM, Duncan, Deidre <dduncan@hunton.com> wrote:

> Lee,
> Hope you are doing well! Quick question. Would you be available to speak at the Energy Bar Association's Annual Conference on the various 401-related issues surrounding energy development. The panel is currently scheduled for 3:45-5:00 on May 7. I will be moderating the panel, and we are hoping to have a FERC, EPA, and Corps representative. I would greatly appreciate your participation. Let me know if you are available. Thanks.
> Deidre

<image001.jpg>

Deidre G. Duncan
Partner
dduncan@hunton.com
Ex. 6
bio | vCard

Hunton & Williams LLP
2200 Pennsylvania Avenue, NW
Washington, DC 20037
hunton.com

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 4/26/2018 4:03:31 PM
To: Wheeler, Andrew R. [Andrew.Wheeler@FaegreBD.com]
CC: Ross, David P [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=119cd8b52dd14305a84863124ad6d8a6-Ross, David]; Ringel, Aaron [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=1654bdc951284a6d899a418a89fb0abf-Ringel, Aar]
BCC: Hladick, Christopher [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=b82d04419c42423a97bd7624a3a09908-Hladick, Ch]
Subject: Options on the Washington Water Quality Standards
Attachments: WA HHC Options_4 26 2018.docx

Sir,

Deliberative Process / Ex. 5

If you have any questions or comments please just let me know.

Respectfully,
Lee

D. Lee Forsgren
Deputy Assistant Administrator
Office Of Water
Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Room 3219 WJCE
Washington, DC 20460
Phone: 202-564-5700
Forsgren.Lee@epa.gov

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 11/20/2017 5:51:09 PM
To: Duncan, Deidre [dduncan@hunton.com]
CC: Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]
Subject: RE: Environmental Law & Policy Conference (DC)

Crystal will do her best to accommodate late in the day Monday.

From: Duncan, Deidre [mailto:dduncan@hunton.com]
Sent: Monday, November 20, 2017 12:42 PM
To: Forsgren, Lee <Forsgren.Lee@epa.gov>
Cc: Penman, Crystal <Penman.Crystal@epa.gov>
Subject: RE: Environmental Law & Policy Conference (DC)

Hi there. I wanted to circle back on this conference on November 30. I was hoping to have a call with Lee and the other panelist (Aurelia Skipwith at DoI) sometime next week before the conference. Does Lee have some time either on Monday before 10:00 or after 3:00 or anytime next Tuesday to talk about the panel. I will send a call in number if we can schedule something. Let me know.
Deidre

From: Forsgren, Lee [mailto:Forsgren.Lee@epa.gov]
Sent: Monday, October 30, 2017 12:51 PM
To: Duncan, Deidre
Cc: Penman, Crystal
Subject: RE: Environmental Law & Policy Conference (DC)

Deidra,

I would be honored to participate if my schedule will permit. Crystal Penman of my office will work with you to see what the art of the possible might be.

Regards,
Lee

D. Lee Forsgren
Deputy Assistant Administrator
Office Of Water
Environmental Protection Agency
1200 Pennsylvania Avenue, VW
Room 3219 WJCE
Washington, DC 20460
Phone: 202-564-5700
Forsgren.Lee@epa.gov

From: Duncan, Deidre [mailto:dduncan@hunton.com]
Sent: Monday, October 30, 2017 12:46 PM
To: Forsgren, Lee <Forsgren.Lee@epa.gov>
Subject: Environmental Law & Policy Conference (DC)

Hello, Lee. I really enjoyed hearing you speak at the recent NMA event, and I wanted to see if you might be available to speak at an upcoming event. Our law firm, Hunton & Williams LLP, is hosting an Environmental Law and Policy Conference in Washington, D.C. on November 30, 2017 from 1:00 – 5:30 p.m. For each of the past several years, Hunton & Williams has invited senior Administration officials from various key agencies and departments to discuss the important environmental issues facing the Administration. We've been fortunate each year to have several high level panelists (e.g., Avi Garbow, then EPA General Counsel was our keynote last year) and we will have similar participants this year. We have about 150+ attendees each year – mostly general counsels, assistant general counsels and decision makers for organizations who are knowledgeable about environmental issues.

We currently have Ms. Aurelia Skipwith scheduled to speak from 2:45-3:30 on natural resources issues, particularly Endangered Species Act and other species-related issues. We were hoping that you could join her on the panel to address the wetlands and water issues, and in particular the upcoming WOTUS rulemaking. Let me know if you are available and could participate. Thanks so much, and I hope you can make it on November 30th!

Deidre Duncan
Ex. 6

HUNTON& WILLIAMS

Deidre G. Duncan
Partner
dduncan@hunton.com
Ex. 6
bio | vCard

Hunton & Williams LLP
2200 Pennsylvania Avenue, NW
Washington, DC 20037
hunton.com

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 11/27/2017 11:06:31 PM
To: Aurelia Skipwith [aurelia_skipwith@ios.doi.gov]; dduncan@hunton.com
CC: Turner, Andrew [aturner@hunton.com]; Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]; Thomas Garcia [thomas_garcia@nps.gov]; Maureen Foster [Maureen_Foster@ios.doi.gov]
Subject: RE: Environmental Law & Policy Conference (DC)

Aurielia,

Crystal Penman will see if that will work with my schedule. As you might expect things are a bit busy here as well.

Lee

D. Lee Forsgren

Deputy Assistant Administrator
Office Of Water
Environmental Protection Agency
1200 Pennsylvania Avenue, VW
Room 3219 WJCE
Washington, DC 20460
Phone: 202-564-5700
Forsgren.Lee@epa.gov

From: Aurelia Skipwith [mailto:aurelia_skipwith@ios.doi.gov]
Sent: Monday, November 27, 2017 6:01 PM
To: Forsgren, Lee <Forsgren.Lee@epa.gov>; dduncan@hunton.com
Cc: Turner, Andrew <aturner@hunton.com>; Penman, Crystal <Penman.Crystal@epa.gov>; Thomas Garcia <thomas_garcia@nps.gov>; Maureen Foster <Maureen_Foster@ios.doi.gov>
Subject: Re: Environmental Law & Policy Conference (DC)

Lee and Deidre,
I'm getting on a plane at 4:50pm EST so I'll only be able to attend for ~15 minutes. Can we talk before 1pm EST or on Wednesday? Thank you.

Sent from my iPhone

On Nov 23, 2017, at 8:43 PM, Aurelia Skipwith <aurelia_skipwith@ios.doi.gov> wrote:

> I'm on a flight during this time. Can we talk on Friday or Monday. Thank you.
>
> Sent from my iPhone
>
> On Nov 20, 2017, at 1:07 PM, Forsgren, Lee <Forsgren.Lee@epa.gov> wrote:

Hopefully, both of you can join at this time to coordinate our panel discussion.
Deidre

-----Original Appointment-----
From: Penman.Crystal@epa.gov [mailto:Penman.Crystal@epa.gov] **On Behalf Of** Forsgren, Lee
Sent: Monday, November 20, 2017 12:55 PM
To: Forsgren, Lee; Duncan, Deidre
Subject: Environmental Law & Policy Conference (DC)
When: Tuesday, November 28, 2017 5:00 PM-5:45 PM (UTC-05:00) Eastern Time (US & Canada).
Where: Call in Ex. 6

<mime-attachment.ics>

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 12/7/2017 3:28:32 PM
To: Schwartz, Jerry [Jerry_Schwartz@afandpa.org]
Subject: Re: Phone Call

Just tried to call. Have to go back into a meeting. Will try again later.

Sent from my iPhone

On Dec 7, 2017, at 9:07 AM, Schwartz, Jerry <Jerry_Schwartz@afandpa.org> wrote:

> Lee,
>
> It is urgent and we should talk as soon as possible.
>
> Jerry
>
> **From:** Forsgren, Lee [mailto:Forsgren.Lee@epa.gov]
> **Sent:** Thursday, December 7, 2017 9:26 AM
> **To:** Schwartz, Jerry <Jerry_Schwartz@afandpa.org>
> **Subject:** Re: Phone Call
>
> Jerry
>
> Am on travel and not really available today. Will be back in the office tomorrow. Let's talk then.
>
> Lee
>
> Sent from my iPhone
>
> On Dec 7, 2017, at 8:05 AM, Schwartz, Jerry <Jerry_Schwartz@afandpa.org> wrote:
>
> > Mr. Forsgren,
> >
> > Please give me a call at the number below or my cell number: Ex. 6
> > Ex. 6 Thank you.
> >
> > **Jerry Schwartz**
> > Senior Director
> > Energy and Environmental Policy
> > Jerry_Schwartz@afandpa.org
> > Ex. 6
> > AMERICAN FOREST & PAPER ASSOCIATION
> > 1101 K Street, N.W., Suite 700
> > Washington, D.C. 20005
> > <image001.jpg> <image002.jpg> <image003.jpg><image004.jpg><image005.jpg><image006.jpg>

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 12/7/2017 2:25:57 PM
To: Schwartz, Jerry [Jerry_Schwartz@afandpa.org]
Subject: Re: Phone Call

Jerry

Am on travel and not really available today. Will be back in the office tomorrow. Let's talk then.

Lee

Sent from my iPhone

On Dec 7, 2017, at 8:05 AM, Schwartz, Jerry <Jerry_Schwartz@afandpa.org> wrote:

> Mr. Forsgren,
>
> Please give me a call at the number below or my cell number: Ex. 6 Thank you.
>
> **Jerry Schwartz**
> Senior Director
> Energy and Environmental Policy
> Jerry_Schwartz@afandpa.org
> Ex. 6
> AMERICAN FOREST & PAPER ASSOCIATION
> 1101 K Street, N.W., Suite 700
> Washington, D.C. 20005
> <image001.jpg> <image002.jpg> <image003.jpg><image004.jpg><image005.jpg><image006.jpg>

Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 10/20/2017 10:32:20 PM
To: Phillp.a.Cooney@ExxonMobil.com
BCC: Ex. 6
Subject: Wanted to catch up and ask if you could take the time to talk to Ex. 6

Phil,
It has been a while since we talked. Since we last talked I have joined the Administration and am back working on the issues we have both worked on for years. Ex. 6

Ex. 6

Could I ask a personal favor. Ex. 6

Ex. 6

Could you take a few minutes and talk with him. I would consider it a personal favor.

V/R
Lee

D. Lee Forsgren
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Message

From: Forsgren, Lee [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=A055D7329D5B470FBAA9920CE1B68A7D-FORSGREN, D]
Sent: 11/2/2017 3:22:51 PM
To: Khary Cauthen [cauthenk@api.org]
CC: Harb, Kim [Kim.Harb@alyeska-pipeline.com]; Penman, Crystal [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=93662678a6fd4d4695c3df22cd95935a-Penman, Crystal]
Subject: Re: Clean Water Act Small Vessel NPDES General Permit

Kim,

I am on travel out of the country this week. Can we talk next week? Crystal Penman can help find a time that works for all of us.

Lee

Sent from my iPhone

On Nov 2, 2017, at 9:10 AM, Khary Cauthen <cauthenk@api.org> wrote:

> Lee/Kim sorry for being slow to link the two of you up.
>
> Lee: Kim has a question regarding the pending the current treatment expires next month on December 18th
> You should also know that Kim has a wealth of experiences from her time in prior administrations and is willing to assist and has some thoughts to share as appropriate on a more durable permanent solution.
>
> Kim: Lee is the man with the plan and the Deputy AA in the Water Office who comes recommended. His desk # is 202-564-0311